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THE

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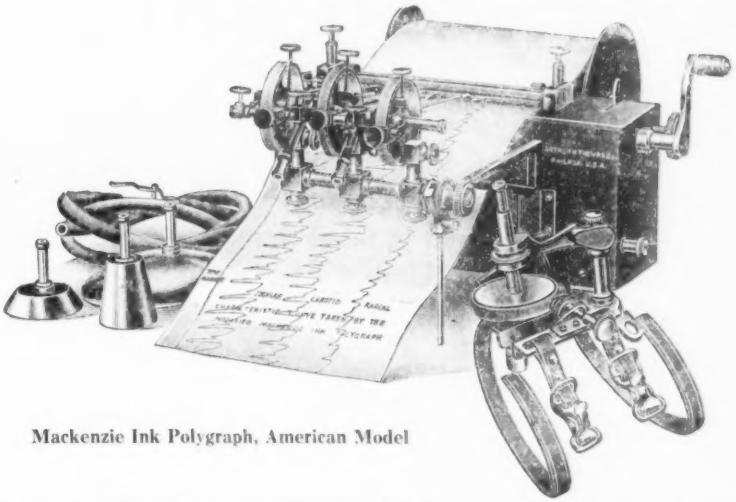

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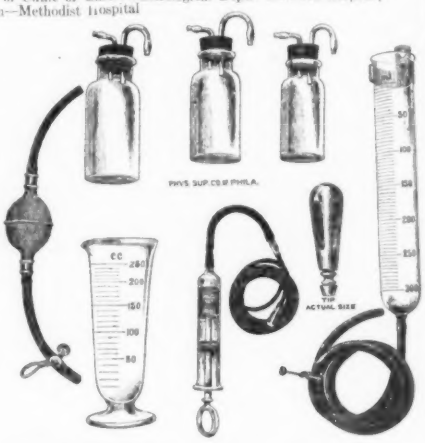

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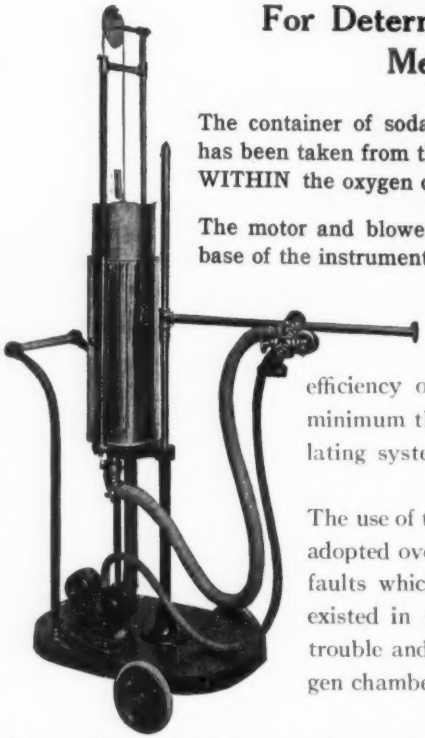

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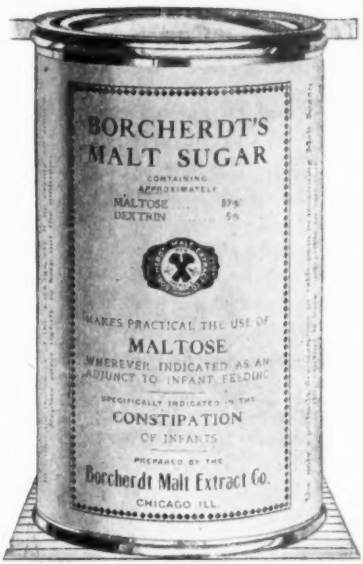

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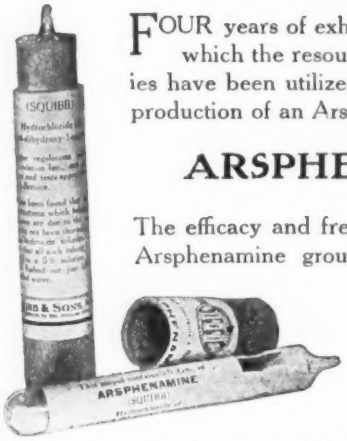

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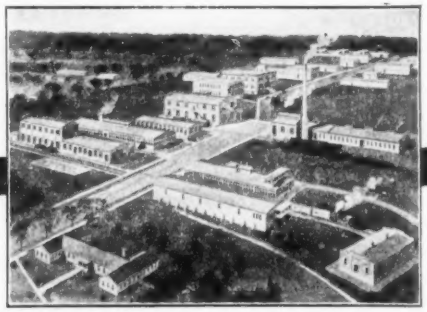

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JULY, 1921

ORIGINAL ARTICLES.

THE LEUKOCYTIC PICTURE IN INFLUENZA.

By C. H. Bunting, M.D.,

MADISON, WIS.

(From the Pathologic Laboratory of the University of Wisconsin.)

The two recent epidemics of influenza have given opportunity for restudying the blood changes in this disease. Yet such study, judging from the reports, has been for the most part incidental to a general clinical study and has not been sufficient to establish the leukocytic picture in the infection. At least I have found but one paper, that of Adler,[1] of Zurich, in which the blood findings have been a matter of primary interest and have received adequate consideration.

In the text-books on clinical diagnosis and on medicine commonly available to students the notes on the leukocytic picture of influenza are hazy and contradictory. These books, as a matter of course, have not had the benefit of the findings in the recent epidemics. Further, in many cases, their statistics seem to have been compiled from single counts in a patient, without reference to the day of the disease, or without accurate determination of the presence or absence of complications in the patient. Thus, Cabot[2] states that five-sixths of his cases had a normal leukocyte count, and of the eleven with leukocytosis one or more had complications. Emerson[3] reports that after an early low leukocyte count one-half of his cases showed a count of over 10,000 cells, some even reaching a count of 20,000. Yet in his statement that "influenza covers a wide group

[1] Folia Hæmatologica, November, 1919, xxv, 16.
[2] Clinical Examination of the Blood, 2d edition, 1898, p. 214.
[3] Clinical Diagnosis, 2d edition, 1908, p. 528.

of cases," one has evidence that at the time of publication (1908) he did not have a clear-cut idea as to the specificity of the infection. Simon[4] states that in uncomplicated cases the leukocytes are commonly diminished but may be normal, and that with a count of over 15,000 cells some complication is present. During the course of the disease he records a lymphocytosis with low neutrophile and eosinophile values, and a return of neutrophile values to normal with convalescence. Webster[5] states that there is usually a diminution in white cells, though a normal count may be found. Bass and Johns[6] tabulate little or no increase in leukocytes, with a differential increase in both neutrophiles and small mononuclears. Sahli[7] makes no note of the blood picture because of the vague conceptions of the disease. The blood changes are apparently considered by some to have no importance in diagnosis, as no note is found concerning them in Albutt, in *Monographic Medicine*, or in Musser. Lord,[8] in Osler's *Modern Medicine*, reports that in 167 cases representing the simple acute form of the disease with slight respiratory disturbance the leukocytes did not exceed 12,000 in 70 per cent., and in the other 30 per cent. the greater leukocytosis could not be accounted for by complications. With deeper involvement of the respiratory tract, one-half of 54 cases with bronchitis and two-thirds of twelve cases with pneumonia gave a count of more than 12,000.

In the journal reports of the 1918 epidemic, chiefly from the army camps, the statements of blood-findings are much sharper and show closer agreement.[9] Keeton and Cushman found a leukopenia (with a minimum count of 900 cells) in 46.6 per cent. of their cases and a normal count in 24.7 per cent.; in the cases with recovery after bronchopneumonia there was a leukocytosis in 62.2 per cent.; and in the bronchopneumonia cases with fatal outcome a leukocytosis in but 41.3 per cent. Brem, Bolling and Casper[10] found a leukopenia practically always, in the influenzal stage, and they concluded that the initial infection produced a depression of the bone-marrow, but that the latter was capable of stimulation in secondary pyogenic infection. Ross and Hund[11] found a leukopenia with a count from 1800 to 3000 in their desperately ill influenza-pneumonia cases. Dever, Boles and Case[12] found a tendency toward leukopenia well marked in some cases of uncomplicated influenza and a leukocytosis in the majority of the cases with a complicating pneumonia. Zeedick[13] found a normal count or a leukopenia in most of the uncomplicated cases and is much inclined to the opinion that any count above normal means a secondary bacterial invasion. In his

[4] Clinical Diagnosis, 6th edition, 1907, p. 100.
[5] Diagnostic Methods, 3d edition, 1913, p. 499.
[6] Laboratory Diagnosis, 1917, p. 57.
[7] Clinical Diagnosis, 2d edition, (Potter), 1911, p. 801.
[8] Modern Medicine, 1907, ii, 481.
[9] Jour. Am. Med. Assn., 1919, lxxii, 640.
[10] Ibid., 1918, lxxi, 2138. [11] Ibid., 1919, lxxii, 640. [12] Ibid., 1919, lxxii, 265.
[13] Studies in Epidemic Influenza, Univ. of Pittsburgh, 1919.

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opinion leukocytosis at the end of the course is not a part of the blood picture, but there is instead a gradual return to the normal count in convalescence; while with pneumonia there is, as a rule, a very moderate leukocytosis if there is not a leukopenia. Kinsella and Broun[14] have emphasized, in addition to these leukocyte pictures, the great reduction in blood-platelets that occurs in the disease.

Adler,[15] whose paper came to hand after the completion of the study to be reported here, has attempted to construct the leukocytic picture of the disease by daily total and differential counts on the patients. He finds an increase in leukocytes during the prodromal stage and on the first febrile day. This is followed by a leukopenia, with reduction in neutrophiles, eosinophiles and basophiles which is due to marrow inhibition. This is succeeded by a positive marrow reaction, until, on the fourth or sixth day, the blood-picture approaches the normal. There is also an early absolute reduction in number of lymphocytes, followed by a reactive lymphocytosis. Adler insists that a disease with a constant leukocytosis cannot be influenza. He draws a further sweeping conclusion, possibly not entirely justified, that diseases which result in immunity show in their course a leukopenia, diseases without an immunity a leukocytosis. Two apparently striking exceptions, scarlet fever and smallpox, he explains on the dominance of the picture by the secondary streptococcic invader.

One may summarize these more recent reports by stating that in influenza there is an early inhibition (not exhaustion) of the marrow activity by the infecting agent, resulting in a leukopenia which is characteristic of the disease. The marrow is capable of stimulation upon pyogenic infection as a complication, and there results a leukocytosis usually of moderate degree.

During the 1920 epidemic of influenza among the students of the University of Wisconsin the author made a daily study of the differential leukocyte picture in a short series of cases treated in the University Infirmary. This study was made with no thought of a publication of statistical results, but merely with the hope that it might throw some light on the nature of the disease and on some of its phenomena. I realize the series of cases is short and publication is hardly justified from the standpoint of statistics. Yet conclusions that may be drawn from the uniformity of findings (within the limits of individual variation), and, further, certain practical points in the care of patients, indicated by the blood findings, seem to justify reporting the work. I wish to express here my indebtedness to Dr. W. S. Middleton for the clinical notes, and to Miss Hazel Gray for the great majority of the total leukocyte counts.

In the hope of obtaining the leukocytic picture of the primary infection, cases were selected which showed no signs of deep respiratory infection upon admission. As it happened no case which was

[14] Jour. Am. Med. Assn., 1920, lxxiv, 1070. [15] Loc. cit.

selected terminated fatally, but several cases did show complications in the course of the disease. Some had very mild attacks and were sent from the hospital to their rooms as soon as afebrile, but before their blood picture had returned to normal. This was necessitated by the extent of the epidemic and the demand for beds for the very sick, and is not to be construed as the general practice in regard to the student sick or as a practice to be recommended. In fact, the main practical point that comes from a study of the blood picture in influenza is that patients should be carefully attended until the blood does return practically to normal.

In making the daily differential counts it has been thought sufficient to count 200 cells, if the two hundreds, as such, did not materially differ from each other in proportion of cells. If there was marked difference an increased number was counted. It is realized that in single counts no number less than 500 cells will give an accurate percentage for the cells which exist in the circulation in small proportion, as the eosinophiles and basophiles. In repeated counts, however, and where the main interest is in the cells largely represented, as neutrophiles and lymphocytes, the smaller number gives close accuracy in well-made cover-slip smears. The cells have been classed into seven groups: neutrophiles, eosinophiles, basophiles, small lymphocytes, large lymphocytes, large mononuclear cells and transitionals. But one or two of these groups need explanation. The cell classified as a large lymphocyte is the lymphocyte with considerable protoplasm which has usually a somewhat acidophilic reaction and contains commonly a few coarse azurophile sometimes rod-like granules when stained by Wright's stain. This has been considered by the author to be a more mature small lymphocyte and is found normally in the blood stream. The large mononuclear is a large cell with round or oval nucleus and has been considered an immature form of the so-called transitional which has a polymorphous nucleus. If we may trust the oxidase reactions these are both chiefly of marrow origin in the normal blood.

The cases and their blood counts follow. The first group of five cases consists of those with light attacks and with no pulmonary complications.

CASE I.—Mr. E.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 21	13,000	76.5	9945	0.0	0.0	0.5	65	9.5	1235	1.5	195	0.0	0.0	12	1560
22	7,000	35.5	2485	1.0	70	1.5	105	39.5	2695	2.5	175	1.0	70.0	19	1330
23	6,800	42.0	2856	3.5	238	1.5	102	36.5	2482	4.0	272	0.0	0.0	125	1250

Blood-platelets distinctly fewer than normal on all smears. Patient admitted with temperature of 102.8° on the morning of January 21. Afebrile on January 22; discharged January 24. No pulmonary symptoms or findings, no complications.

CASE II.—Miss H. G.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 25	7800	79.0	6162	0.0	0.0	0.0	0.0	12	936	0.5	39	0.0	0.0	7.5	585
26	5000	58.5	2925	0.5	25.0	0.5	25.0	25	1250	3.0	150	0.0	0.0	12.5	625
27	4200	46.5	1953	0.5	21.0	2.0	84.0	32	1344	4.0	168	0.5	21.0	14.5	609

Blood-platelets distinctly diminished after the first day. Patient admitted during evening of January 24 with temperature of 103.2°; afebrile on January 28.

CASE III.—Miss H.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 20	....	58.0	..	0.0	..	0.0	..	29.3	..	4	..	2.3	..	6.3	
21	5200	55.5	2886	0.5	26	0.0	0.0	32.5	1690	4	208	1.0	52	6.5	348
22	6000	70.0	4200	0.0	0.0	0.0	0.0	20.5	1230	1	60	0.0	0.0	8.5	510

Platelets extremely few until January 22. Patient admitted January 20 with temperature of 100°. Afebrile afternoon of January 21. No complications or pulmonary signs. Discharged January 23. In the confusion attendant upon the rush of patients on January 20, a number of the total leukocyte counts were not recorded. In this case there was evidently a leukopenia or normal count, judging from the differential.

CASE IV.—Mr. M.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 25	6800	61.5	4182	0.0	00	0.0	00	23.0	1564	2.0	136	0.0	00	13.5	918
26	6200	36.5	2263	0.5	41	0.5	31	44.5	2759	6.5	403	1.5	93	10.0	620
27	8400	43.0	3612	0.5	42	0.0	00	37.0	3118	12.0	1008	3.0	252	4.5	378

Platelets few after January 25. Patient admitted evening of January 24 with temperature of 101.2°. Afebrile afternoon of January 26. Discharged January 28. No complications and no signs of pulmonary involvements.

CASE V.—Dr. M.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 25	7300	70.0	5110	0.0	00	1.0	73	16.5	1204	4.0	292	0.0	00	8.5	621
26	6000	52.5	7150	2.5	150	1.0	60	24.5	1470	6.5	390	0.0	00	13.0	780
27	6400	59.5	3808	6.0	384	0.5	32	18.0	1152	6.0	384	0.0	00	10.0	640

Platelets few throughout. Pseudopodial forms noted. Patient admitted on second febrile day. Afebrile after noon of January 26. Discharged evening of January 27. No complications or pulmonary signs.

In this group of mild attacks of the disease there was a moderately sharp fever on the first day of definite illness, and a rapid decline of temperature, with recovery on the third or fourth day, without complications. From the standpoint of the leukocytes it is evident that there may be a moderate leukocytosis at the outset of the attack. Even without a definite or marked increase in total leukocytes there is a relative neutrophile leukocytosis in those cases seen early enough. This is followed by a sharp drop in total leukocyte count due, in chief, to a pronounced fall in the number of polymorphonuclear neutrophiles, the total number of which per unit of circulation may be but from 25 to 50 per cent. of that on the previous day. The lymphocytes, on the other hand, show both a relative and *and absolute* increase in number. Large mononuclears and transitionals vary slightly in reaction in the different cases, there being either a slight fall in number or practically a constant number. Eosinophiles and basophiles are either absent from the circulation or present in very small numbers. Blood-platelets show a sharp decrease, as estimated from the blood smear. In Case III they were extremely few, and the formation of platelet-like bodies from the large lymphocytes, as reported in another paper,[16] was noted.

On the third day of disease in these mild cases we find, except in one case, a slight increase in total number of neutrophiles; some variation in the lymphocyte numbers, but usually an indication that the peak of reaction has been passed; little change in the large mononuclear group; a low count of eosinophiles in three cases, with a slight eosinophilia in two.

The next two cases ran a somewhat more severe course but without any pneumonia patches, although one had bronchial rales throughout.

CASE VI.—Miss E. H.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 21	10,600	73.5	7791	0.5	53	0.5	53	13.5	1431	2.0	212	0.0	00	10.0	1060
22	4,400	41.5	1826	0.0	00	0.5	22	36.5	1606	2.0	88	1.0	44	17.5	770
23	6,400	49.0	3136	0.0	00	0.5	32	34.0	2176	1.5	96	2.0	128	13.0	830
25	6,200	43.0	2666	0.0	00	0.0	00	45.0	2790	2.0	124	1.5	93	8.5	527
26	8,000	48.5	3880	0.0	00	0.5	40	35.5	2840	5.5	440	2.5	200	8.0	640
27	4,600	38.0	1748	0.5	23	0.5	23	43.0	1978	5.5	253	1.0	46	11.5	539

Platelets numerous January 21, then diminished until Janury 25, when increase apparent. Patient admitted January 21 with temperature of 102.4°. Gradual decline until January 25 when afebrile. No complications. Discharged January 27.

[16] Johns Hopkins Hosp. Bull., 1920, xxxi, 439.

Case VII.—Miss E.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 20	...	53.0	..	0.5	..	0.5	..	21.5	...	13.5	..	0.5	..	10.5	
21	6200	40.5	2511	0.5	31	0.0	00	34.0	2108	13.0	716	0.5	31	11.5	713
22	3400	41.0	1394	1.0	34	0.0	00	37.0	1258	10.5	357	0.5	17	10.0	340
23	3600	43.5	1566	1.0	36	0.0	00	32.5	1160	11.0	396	1.5	54	10.5	378
24	2600	42.0	1092	0.0	00	1.0	26	37.0	962	10.5	273	0.5	13	9.0	234
25	9000	47.5	4275	0.0	00	0.0	00	30.0	2700	11.5	1035	1.0	90	10.0	900
26	6000	52.0	3120	0.5	30	0.0	00	30.5	1830	9.5	570	2.5	150	5.0	300
27	...	56.0	..	0.0	00	0.5	00	32.0	..	5.0	..	1.5	..	5.0	

Platelets relatively few throughout. Patient admitted January 19 with evening temperature of 101°. Temperature ranged between 101.4° and 99° until January 26 when afebrile. No complications beyond the presence of rales at left apex from onset. Moderately severe course. Discharged January 27.

In these two cases we have the same features as shown in the earlier cases, but they are more pronounced, especially as far as the fall in neutrophile leukocytes is concerned. This leukopenia is also more persistent.

The following cases developed pneumonic patches and other complications during the course of their illness, but showed eventual recovery.

Case VIII.—Miss V.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 21	6,600	71.0	4,686	0.0	00	0.5	33	8.5	561	3.0	198	1.5	99	15.0	990
22	4,400	30.5	1,342	0.0	00	0.5	22	35.0	1540	1.0	44	2.5	110	21.5	946
23	9,600	66.0	6,336	1.0	96	0.5	48	16.0	1536	7.0	672	1.0	96	8.5	816
24	5,400	71.0	3,834	0.0	00	0.0	00	14.0	756	3.5	189	0.5	27	11.0	594
25	9,600	73.5	7,056	0.0	00	0.0	00	6.0	576	5.0	480	0.5	48	15.0	1440
26	14,000	76.0	10,640	0.0	00	0.0	00	7.5	1050	1.5	210	2.0	280	13.0	1820
27	19,400	80.5	15,617	0.0	00	0.0	00	8.5	1649	0.0	00	0.5	97	10.5	2037
28	16,000	79.5	12,720	0.0	00	0.0	00	6.0	960	3.0	480	0.0	00	11.5	1840
29	17,800	73.0	12,994	0.0	00	0.0	00	7.0	1246	2.5	445	0.0	00	17.5	3115
30	15,000	70.5	10,545	0.0	00	0.0	00	8.5	1275	2.5	375	0.5	75	18.0	2700
31	14,200	67.5	9,585	0.0	00	0.5	71	12.5	1775	3.0	426	0.0	00	16.5	2343
Feb. 1	14,400	74.0	10,656	1.0	144	0.5	72	10.0	1440	1.0	144	0.0	00	13.5	1944
2	21,000	80.5	16,905	0.5	105	1.0	210	9.0	1890	2.0	420	0.0	00	7.0	1470
3	9,200?	76.0	6,992	0.5	46	0.5	46	12.5	1150	0.5	46	0.5	46	9.5	874
4	17,400	79.0	13,746	1.0	174	0.5	87	7.5	1305	3.0	592	0.0	00	9.0	1596

Platelets relatively few until January 27 increasing afterward to an apparent maximum on February 3 and 4. Patient admitted January 21 with temperature of 103.4°. Temperature normal January 22. On January 23 temperature rose to 100.8° in the afternoon, when a pleuritic friction rub was heard and patches of consolidation made out in the lower right lobe. Thereafter there was irregular fever with a maximum of 104.8° on January 28. Temperature declined from this point, but persisted until February 3. An otitis media had developed and the ear drum was incised on February 1.

CASE IX.—Mr. S.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 24	6,600	41.0	2,706	0.5	33	0.5	33	36.0	2376	9.0	594	2.0	132	11.0	726
26	5,200	43.0	2,236	0.0	00	0.0	00	32.5	1690	7.0	364	1.0	52	16.5	858
28	5,400	34.0	1,836	1.5	81	0.0	00	42.0	2268	6.5	351	1.0	54	15.0	810
29	17,200	80.0	13,760	0.0	00	0.5	86	8.0	1376	2.5	431	0.5	86	8.5	1462
30	12,600	73.0	9,198	0.0	00	0.0	00	13.0	1638	3.0	378	0.5	63	10.5	1323
31	16,200	73.5	11,907	1.0	162	0.0	00	12.0	1944	0.5	81	0.0	00	13.0	1106

Platelets distinctly few until January 29, remaining above normal thereafter. Patient admitted on January 24 with temperature of 102°. Temperature normal on January 27 and 28. On January 29 temperature rose to 102.2° and a patch of decreased resonance and increased fremitus was found in the lower right lobe. Temperature normal on February 1; rose again on February 3, when patient was found to have parotitis Eventual recovery.

CASE X.—Miss K.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 20	...	71.0	...	0.0	..	1.5	..	14.5	..	6.0	..	0.0	..	7.0	
21	...	57.0	...	1.0	..	0.0	..	27.0	...	7.5	..	1.5	..	6.0	
23	6,200	66.5	4123	0.0	00	0.0	00	21.0	1302	6.5	403	1.5	62	5.0	310
24	5,200	64.0	3328	0.0	00	0.5	26	24.0	1248	3.5	182	0.5	26	7.5	390
25	8,400	76.5	6426	0.0	00	0.0	00	15.0	1260	3.0	252	3.0	252	2.5	210
26	10,600	57.0	6042	0.0	00	0.5	53	28.0	2968	5.0	530	0.5	53	9.0	954
29	12,200	68.0	8296	0.5	61	0.0	00	17.5	2135	5.0	610	1.0	122	8.0	978

Platelets relatively few until January 29. Patient admitted January 19, with temperature of 101.2° with rales at both bases posteriorly. On January 21, a patch of consolidation in the lower right lobe was diagnosed. On January 25 consolidation was found at both bases. Temperature was normal on January 27. Convalescence was delayed by the development of new areas of consolidation in the right infrascapular region on February 5, with new febrile reaction which persisted until February 11. Recovery.

In two of these we have a characteristic behavior of the leukocytes in the early phases of the disease. The neutrophiles reach a low level in the circulating blood. Clinically the patients' temperature reached normal, and one might have expected immediate recovery; but there is a return of fever and, coincidently, a change in leukocytic picture to a neutrophile leukocytosis and an area of pulmonary consolidation is discovered. After a period of irregular but fairly high leukocytosis there is recovery. Case X, with a somewhat irregular leukocytic picture, yet with early characteristics that indicate its etiology, shows a much feebler response to the pulmonary infection, and clinically the case had a longer course.

There is a consistency in these blood findings which would seem to justify certain conclusions, if not from these cases alone, at least when they are taken in conjunction with the work of others. They show that uncomplicated influenza has a characteristic blood picture. The features of this are an early neutrophile leukocytosis followed by a sharp drop to a leukopenia, with a marked deficiency in cells of marrow origin and of blood platelets and with a lym-

phocytosis of varying degree. There is a gradual return toward a normal picture, but a cessation of fever and of symptoms may occur with the presence of a very abnormal blood count.

This leukopenia suggests somewhat that of typhoid fever and also somewhat that of measles. It indicates sharply that the primary infecting agent is not a pyogenic coccus. The leukopenia in influenza would appear to depend upon a marrow inhibition like that in typhoid fever and not upon a severe injury to the marrow or to its exhaustion for in both diseases, given a pyogenic stimulation of the marrow through secondary infection, there is immediate response with a neutrophile leukocytosis, at least in reactive individuals. Even in other cases, as in the last of the series, with low total count, marrow response is shown in the relative neutrophile increase. What the nature of this marrow inhibition or negative chemotaxis may be is not evident.

This great poverty in circulating neutrophilic leukocytes would seem to account for the frequency of pyogenic complications in influenza. The complications in Cases VIII and IX have followed directly upon a very low neutrophile blood content. These cases, taken in conjunction with observations in measles and other conditions in which there is a similar low content of neutrophiles and succeeding pyogenic complications, suggest strongly that there is a danger limit of neutrophile reduction beyond which we become a prey to coccus infection—either from those we harbor or from those received from others by contagion. This is the basis for the point emphasized earlier, that in practice, influenza patients should not be allowed to get up and resume their ordinary life immediately upon the cessation of fever, but should be kept quiet and isolated until their blood has approached at least the normal leukocytic formula, which apparently requires almost a week from the cessation of fever.

The great platelet decrease in the blood in influenza, apparent in blood-smears, but established by the actual counts of Kinsella and Broun,[17] is apparently responsible for the hemorrhagic character of the pneumonic exudate in that complication of the disease. Given endothelial injury through the secondary infection, one would expect a much prolonged bleeding time as a result of this platelet deficiency, also some deviation from normal in coagulation.

In view of the blood changes there arises an interesting theoretical question as to the nature of the cellular defense (if such there be) against the invading virus. Conquest of the infecting agent clearly is not brought about through the agency of the neutrophile leukocytes, as they remain particularly low throughout the uncomplicated attack. There is often, and probably, as a rule, a sharp lymphocytosis, but evidence from this series is not sufficient to credit this cell absolutely with the destruction of the infecting agent and the establishment of the immunity that is acquired.

[17] Loc. cit.

CASE IX.—Mr. S.

1920.	Total count.	Neutrophiles.		Eosinophiles.		Basophiles.		Small lymphocytes.		Large lymphocytes.		Large mononuclears.		Transitionals.	
		Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.
Jan. 24	6,600	41.0	2,706	0.5	33	0.5	33	36.0	2376	9.0	594	2.0	132	11.0	726
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[17] Loc. cit.

OBSERVATIONS ON THE BASAL METABOLISM ESTIMATIONS IN THE GOITER CLINIC OF THE UNIVERSITY HOSPITAL.

By Charles H. Frazier, Sc.D.,
SURGEON TO THE UNIVERSITY HOSPITAL,
AND
Francis H. Adler, M.D.,
SURGICAL INTERN IN THE UNIVERSITY HOSPITAL, PHILADELPHIA.

Studies in basal metabolism have been of the greatest scientific value and interest in experimental physiology and research medicine. Our knowledge of the physiology and of the diseases of the thyroid gland is based primarily upon such studies. Is there a practical working value as well in the estimation of the basal metabolic rate; and in what ways are such estimations of value to the surgeon in the diagnosis, prognosis and treatment of cases of hyperthyroidism?

We have found the portable Benedict apparatus of the greatest practical value in this clinic because of its small size and simplicity. In the hands of an experienced operator the readings compare favorably with those taken by the more costly and time-consuming instruments. It has been our practice to take readings on all goiter cases before and after treatment, whether that consist in ligation or thyroidectomy. Before the initial reading is made the patient is run through the various steps in the procedure on one or more days, depending on her nervous state, until we are confident she is no longer alarmed by the experience. If the case comes to ligation as the initial step in treatment a second reading is taken either before leaving the hospital or when the patient returns for thyroidectomy several months later. The final reading, after all treatment is over, is usually made within a year from the last operation, when the patient returns for final observation.

For the convenience of study and analysis we have divided our cases into four groups, based on the metabolic rate.

Group 1.	Basal	metabolic	rate	from	10 to 20	per cent.
Group 2.	"	"	"	"	20 to 40	"
Group 3.	"	"	"	"	40 to 60	"
Group 4.	"	"	"	"	60 and up.	

As the same time we have graded our cases according to the symptomatic evidence of toxicity alone into four groups. This was done without a knowledge of the metabolic rate. In Group 1 we place the mildest cases, *i. e.*, those with the lowest grade of toxicity, and in Group 4 the severest cases, *i. e.*, those with the highest grade of toxicity. Groups 2 and 3 are intermediate. We find that there is a certain conformity between the groups graded by the

clinical picture and graded by the metabolic rate. Table I shows the percentage of cases in each group when classified by the two methods.

TABLE I.

	Per cent. of cases based on basal metabolism.	Per cent. of cases based on clinical pictures.
Group 1	26.4	30.9
Group 2	21.4	19.0
Group 3	30.9	33.3
Group 4	21.4	16.6

The largest percentage of cases fall in Group 3. The conformity between the several groups, as classified on the one hand by the clinical phenomena and on the other by the metabolic rate, is sufficient to enable us to say that in the majority of cases we have in the basal metabolic rate a numerical index of the patient's toxicity. The advantages of having a numerical index is self-evident; it gives us at once a means of classifying our patients, a guide to treatment and a measure of the improvement under any particular treatment. We do not as yet have sufficient confidence in the metabolic rate to allow it precedence over the clinical picture; we regard it merely as one link in the chain of evidence and still rely upon our own judgment as to operative risk and surgical toleration in the interpretation of the symptom-complex, attaching greater significance to loss of weight, emotional instability and pulse-rate.

The metabolic rate is of special value in diagnosis in that it offers a ready means of distinguishing cases of true hyperthyroidism from those cases of neurasthenia, cardiovascular disease or tuberculosis, who present the clinical picture of toxicity and who happen to have a simple adenomatous enlargement of the thyroid. These cases are often sent to the surgeon as a court of last resort. Such cases would naturally not be benefited by any operation and might be made a good deal worse.

The metabolic rate enables us to decide for or against operation in cases in which there is little or no perceptible enlargement of the thyroid gland and in which the only evidence of toxicity is tachycardia. We have had only one instance in which we disregarded a normal metabolic rate and relied upon our interpretation of the clinical picture and operated. On leaving the hospital this case showed clinical improvement, but sufficient time has not elapsed for us to judge of the ultimate result.

In distinguishing between cases of true Graves's disease, *i. e.*, the hyperplastic toxic goiter, and cases of toxic adenoma the observations of the metabolic rates bear out our opinion based on clinical observation, namely, that for practical purposes the two should be treated alike. We find that the metabolic rate may be as high in one as in the other and the operative risks just as great. The distinction is purely a pathologic one, and for the present, at least, we see no reason for laying much stress on it.

In treatment we find that we may be guided by the metabolic rate in the choice of operations. Thus in Groups 1 and 2 we may proceed with a subtotal thyroidectomy at once. In Group 3, in the majority of instances, we first do a bipolar ligation; only occasionally a thyroidectomy as the initial procedure. In Group 4 we never do a thyroidectomy first but choose either unipolar or bipolar ligation.

The metabolic rate is also useful in determining the amount of improvement which any course of treatment may have effected. Table 2 shows the numerical reduction of the metabolic rates after ligation and after thyroidectomy.

TABLE II.—REDUCTION OF THE METABOLIC RATE.

	After ligation. Points.	After thyroidectomy. Points.
Maximum	61.9	60.0
Minimum	2.2	8.0
Average	31.7	28.3

It is interesting to note that after ligation the average reduction was greater than after thyroidectomy. That the two figures cannot be compared, and any deductions drawn as to the relative value of these two procedures is evident when we consider the type of case which is selected for ligation. Those cases which have a preliminary ligation have the highest metabolic rates. In reducing the metabolic rate it is as though we were reducing the height of a pyramid; much less effort is expended in taking away the top half, the labor increasing with each successive step. It is easier, therefore, to cut down the top half of a high metabolic rate by ligation than to remove the remainder, this more difficult part of the work being accomplished by the thyroidectomy. The reduction in total points, therefore, is less after thyroidectomy than after ligation.

Summary. Estimations of basal metabolism are of value in the following ways:

1. Positive. In eliminating those cases which will not be benefited, and might be made worse by operation.

2. Supplemental. (*a*) In offering confirmatory evidence of the degree of toxicity.

(*b*) In offering a quantitative rather than a qualitative index for use in diagnosis, prognosis and treatment.

3. Problematical. It may be possible to determine by the metabolic rate how much thyroid tissue may be removed. The reduction of the metabolic rate to points well below that of the normal range (−10) should imply that too much secreting substance had been removed. Such cases must be studied clinically for signs of hypothyroidism. We have had two patients whose metabolic rate after operation fell well below normal—in one to −17 per cent., the second to −30 per cent. Neither of these cases has shown signs of hypothyroidism.

CLINICAL OBSERVATIONS ON PAROXYSMAL AURICULAR FIBRILLATIONS AND FLUTTER.

By Fred M. Smith, M.D.,
CHICAGO, ILLINOIS.

(From the Department of Medicine of Rush Medical College and the Presbyterian Hospital.)

The following report is based on clinical observations made on paroxysmal auricular fibrillation and flutter. The close relationship of the mechanism of these two conditions, their appearance in the same type of cardiac conditions and their similar clinical significance will permit their being considered together.

A summary of the important features of the clinical histories of the eleven cases covered will be given.

1. *Paroxysmal auricular fibrillation as associated with chronic myocarditis, chronic valvular disease—aortic and mitral regurgitation—arteriosclerosis, hypertension, emphysema and chronic bronchitis.*

Mr. J., janitor, aged sixty, single, entered the Presbyterian Hospital on the service of Dr. Herrick, September 24, 1919. He complained of shortness of breath, cough, weakness and swelling of the feet. The cough had been present for many years during the winter months. The shortness of breath was first noticed in the fall of 1918. Since that time it had been growing progressively worse. In the last few weeks the feet had begun to swell.

Past History. He denied venereal infection. A bilateral herniotomy was done in 1911. At that time a hydrocele was aspirated and one testicle was removed. Later the other testicle was removed. The patient was unable to give any information as to why the testicle was removed other than that it was diseased.

Examination. The lips were cyanosed and there was a marked pulsation of the arteries of the neck. The breathing was shallow and labored. The chest was barrel-shaped. The breath tones were harsh and there were rales at the bases. The apex impulse was heaving and located in the sixth interspace in the anterior axillary line. A diastolic murmur was heard over the aortic area and to the left of the sternum. There was an apical systolic murmur that was transmitted to the axilla. The rhythm was regular except for an occasional premature contraction. The liver edge was palpable and tender. There was a purpuric rash on the legs that had been present at intervals for years. The ankles pitted. The brachial and radial arteries rolled readily under the fingers. The reflexes were present and equal.

Laboratory Findings. Blood: reds, 3,840,000; whites, 10,000; Hb., 70 per cent. Blood-pressure: systolic 190 and diastolic 88. The

Wassermann test on the blood and spinal fluid was negative. The urine was negative.

The patient was given absolute rest in bed and the heart digitalized. He, however, remained very short of breath for several days. On October 1 he had an attack of palpitation of the heart and the breathing became more difficult. The heart-rate was 120 per minute and the rhythm was very irregular. The electrocardiogram showed auricular fibrillation. This attack lasted about twelve hours. A sinus rhythm was maintained during his remaining stay in the hospital. He was discharged in February much improved. Since this time he has been seen at frequent intervals in the Cardiac Clinic of the Central Free Dispensary and has remained free from attacks of rapid irregular heart action.

2. *Paroxysmal auricular fibrillation without much evidence of structural changes in the heart and bloodvessels.*

Dr. H., aged fifty-five, consulted Dr. Herrick for attacks of rapid, irregular heart action. The attacks first appeared five years ago. At that time he had several attacks. Each attack lasted from one to twelve hours. He was not short of breath on exertion. He felt tired most of the time. Following this he grew strong, the cardiac attacks disappeared and for more than four years he did more work than at any other period during his life. About eight months ago he began to feel tired again and the attacks reappeared.

Past History. He had pneumonia at twenty-five and an appendectomy at forty-six.

Examination. On examination the heart was slightly enlarged to the left. The physical findings were otherwise negative. The systolic blood-pressure was 160 mm. Hg and the diastolic 90 mm. Hg. The urine was negative. The electrocardiogram that was taken during an attack showed auricular fibrillation.

3. *Paroxysmal auricular fibrillation associated with mitral stenosis, arteriosclerosis, and focal infection of teeth and tonsils.*

Mrs. B., white woman, single, aged sixty-nine, entered Presbyterian Hospital on Dr. Herrick's service, June 23, 1919. She complained of attacks of palpitation in which the heart-rate was very rapid and the rhythm irregular. The first attack appeared in October, 1918. At first they appeared about every month or six weeks. Lately, however, they were as frequent as three or four a week. They lasted from a few hours to two days. She always held that exertion precipitated an attack. She was not apparently short of breath on exertion. She was told four years ago that she had a systolic blood-pressure of 210 mm. Hg.

Past History. Typhoid at twenty-four, erysipelas at forty-eight. She had frequent sore-throat during early life. The family history was negative.

Physical Examination. Eyes were negative. The lower teeth were false. The upper had several inlays and showed evidence of

pyorrhea. The neck and lungs were negative. The left border of the heart extended 12 cm. to the left of the midsternal line. There was a slight presystolic thrill at the apex and a presystolic and a systolic murmur were heard in this location. There was also a systolic murmur over the aortic area and the second tone was indistinct. The abdomen and extremities were negative except for some hardening of the radial and brachial arteries.

Laboratory Findings. Blood: reds, 3,420,000; whites, 6500; Hb., 58 per cent. Blood-pressure: systolic 168 and diastolic 95. The urine was negative except for a few leukocytes. The Wassermann on the blood and spinal fluid was negative.

During the first four weeks of her stay in the hospital she had frequent attacks of irregular heart action. Electrocardiograms showed the abnormal rhythm to be auricular fibrillation. These attacks lasted from one to twenty-four hours.

X-ray films of the upper teeth showed several small apical abscesses. On July 22 all the upper teeth were extracted. This was followed by a paroxysm of auricular fibrillation. Her tonsils showed evidence of chronic infection and were removed on August 6. She again had a paroxysm of auricular fibrillation. Since that time, *i. e.*, for a period of fourteen months, she has been free from attacks and feels better generally than she has in years.

4. *Paroxysmal auricular fibrillation, chronic nephritis, hypertension, arteriosclerosis and chronic myocarditis.*

Mrs. B., aged sixty-seven, was referred to the cardiac department of the Central Free Dispensary in April, 1920. She had been attending the dispensary at intervals since 1912. At that time she complained of headaches, dizziness and frequent urination. A trace of albumin and granular and hyalin casts were found in the urine. The blood-pressure was 170 systolic and 110 diastolic. At the time of the first examination in the cardiac department she complained of palpitation and rapid heart action. The heart-rate was 130 per minutes and very irregular. She stated that she had had similar attacks at intervals for a period of nine to ten years. At first they were a few minutes to two hours in duration, and appeared on the average of once a month. Lately they have been as frequent as one to two a week and may last from one to two days. The shortness of breath has been more marked in recent attacks and swelling of the feet has been first noticed.

Past History. She had typhoid at fourteen. Four children were living and well. There had been no miscarriages.

Examination. The eyes were negative. The teeth were gone except for a few uppers that were in bad condition. The tonsils were submerged and fibrous. There was a cervical adenopathy. The lungs were emphysematous. The breathing tones were harsh and numerous rales were heard at the bases. The left cardiac border was in the sixth interspace at the anterior axillary line. The tones

were faint. A systolic murmur was heard at the apex and was transmitted to the axilla. The aortic second tone was accentuated. The heart-rate was 120 per minute and the rhythm was very irregular. The liver extended two fingers below the costal margin. The blood-pressure was 170 systolic and 110 diastolic. The urine contained albumin and granular and hyalin casts. The Wassermann on the blood was negative.

The patient was seen the following day. The attack of auricular fibrillation had subsided and she was feeling fairly comfortable. Since this time the cardiac reserve has been built up by the administration of digitalis and by rest and the attacks of auricular fibrillation have been much less frequent.

5. *Paroxysmal auricular fibrillation, which later became permanent, associated with mitral stenosis.*

Mr. L., aged thirty-eight, had been treated at the Central Free Dispensary since 1917. He complained of pains in the joints and frequent sore-throats. At the time of his first visit it was noted that he had a very high-grade mitral stenosis. He had had an attack of rheumatic fever in 1913. Many joints were involved. The tonsils were removed in the summer of 1917. In May, 1919, he was transferred to the Cardiac Clinic. At this time he complained of palpitation, shortness of breath and precordial pain.

Examination. The head, neck and lungs were negative. The left cardiac border was 2 cm. outside of the midclavicular line. The apex impulse was diffuse. There was a marked thrill in this location. A harsh presystolic and a soft diastolic murmur were heard. The heart-rate was 74 per minute and the rhythm was regular except for an occasional premature contraction. The abdomen and extremities were negative.

Laboratory Findings. Blood: reds, 4,200,000; whites, 7800; Hb., 80. Blood-pressure: systolic 110 and diastolic 70. The urine was negative. The electrocardiogram showed a right ventricular preponderance and auricular premature contractions.

The patient improved with rest and digitalis. Later, however, he became more short of breath and complained of having short attacks of very rapid irregular heart action. An electrocardiogram was taken during one of these attacks and showed auricular fibrillation. About two months later the auricular fibrillation became permanent.

6. *Paroxysmal auricular fibrillation. Chronic myocarditis, diabetes and gangrene of the right foot.*

Mr. M., aged fifty-five, entered the Presybterian Hospital on Dr. Herrick's service February 2, 1918. He was told at the Central Free Dispensary that he had sugar in his urine and was sent to the hospital for treatment. He said that he was often thirsty and drank a considerable quantity of water. There was apparently not much polyuria. He had been short of breath on slight exertion for about

two years and had been troubled with a dry cough for many years. He had a soft chancre at the age of twenty-five and three years later gonorrhea. The family history was negative.

Examination. The pupils were equal, regular and reacted to light and accommodation. All the teeth were missing. The chest was emphysematous. There were numerous moist musical rales in the bases of the lungs. In front the breath tones were harsh. The left cardiac border extended to the anterior axillary line. The tones were indistinct. A systolic murmur was heard at the apex. The rhythm was regular. There was a large umbilical hernia. The reflexes were normal. The red blood cells numbered 4,900,000, whites 7500, and the hemoglobin 85 per cent. The systolic blood-pressure was 204 and the diastolic 110. The urine contained 4.3 per cent. sugar; no albumin or casts. The blood Wassermann was negative.

On a carbohydrate-free diet the sugar disappeared from the urine on the second day. On March 3 he had an attack of rapid, irregular heart action. An electrocardiogram showed auricular fibrillation. The attack lasted about twelve hours. He had another attack of auricular fibrillation ten days later. The following day the rhythm was regular and the cardiac rate was 88 per minute. He was discharged from the hospital May 13, 1918. His urine had been free from sugar since the second day after admission to the hospital, and he felt much stronger generally.

He was sent to the hospital again May 30, 1919, by Dr. W. D. Sansum, from the diabetic clinic of the Central Free Dispensary. He complained of pain in the right foot and sugar had again appeared in the urine. Gangrene of the right foot developed rapidly. In the meantime the heart muscle became weak and the auricles began fibrillating. The condition gradually grew worse. Dr. Sansum finally decided to have the right foot amputated. The operation was performed by Dr. C. B. Davis, July 2, under gas anesthesia. The patient had a very stormy period following operation. The cardiac condition did not improve and the stump would not heal. Later, however, the cardiac condition began to improve and the stump gradually healed. On September 9, 1919, the patient was transferred back to Dr. Sansum. The heart had become competent. A sinus rhythm had been established and the urine was sugar-free. He remained in the hospital until May, 1920. During this time he maintained a sinus rhythm while at rest. On a few occasions, however, after slight exertion the auricular fibrillation reappeared with other symptoms of cardiac failure.

7. *Paroxysmal auricular flutter, mitral stenosis and hyperthyroidism.* Mrs. H., married, aged thirty-nine, entered the Presbyterian Hospital on Dr. Herrick's service, November, 1916. She complained of shortness of breath, palpitation of the heart, swelling of the feet, nausea and vomiting, nervousness and loss of weight. She had been

short of breath for about nine weeks. This was first noticed after doing a large washing. At this time she was conscious that her heart was beating rapidly. She first noticed that her feet were swollen three days prior to coming to the hospital. She was extremely nervous and had had difficulty in sleeping. There was no history of rheumatism. She had one child. There had been no miscarriages.

Examination. The eyes were prominent and there was a lagging of the lids. The isthmus and right lobe of the thyroid gland were enlarged. A few rales were heard in the bases of the lungs. The apex impulse was diffuse and most prominent in the fifth interspace. The left cardiac dulness extended out to the anterior axillary line. A palpable thrill was detected at the apex. A presystolic and

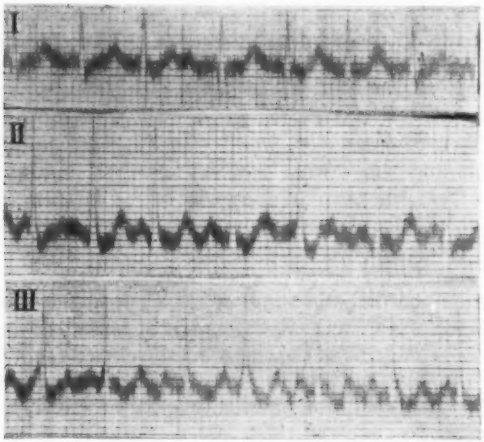


FIG. 1.—Case VII. This electrocardiogram was taken during the first cardiac attack. Some of the cycles of lead II, and especially lead III, resemble very much that of auricular flutter.

systolic murmur were heard in this location. The pulmonic second tone was accentuated. The heart-rate was 100 per minute. There was an occasional premature contraction. The liver was palpable and tender. There was a slight pitting of the ankles.

Laboratory Findings. Blood: reds, 4,200,000; whites, 9900; Hb., 85 per cent. Blood-pressure: systolic 135 and diastolic 70. The urine was negative.

On December 20 the patient suddenly became conscious of the rapid beating of her heart. She felt weak and was dyspneic. The heart-rate was about 160 per minute and the rhythm was very irregular. This was, according to the patient, the first attack of this nature. The electrocardiogram (Fig. 1) was taken. In some

cardiac cycles the auricular activity was suggestive of flutter, in others of fibrillation. She had a similar attack the following day. The electrocardiogram was the same as that taken during the first attack. She gradually improved under rest and general manage-

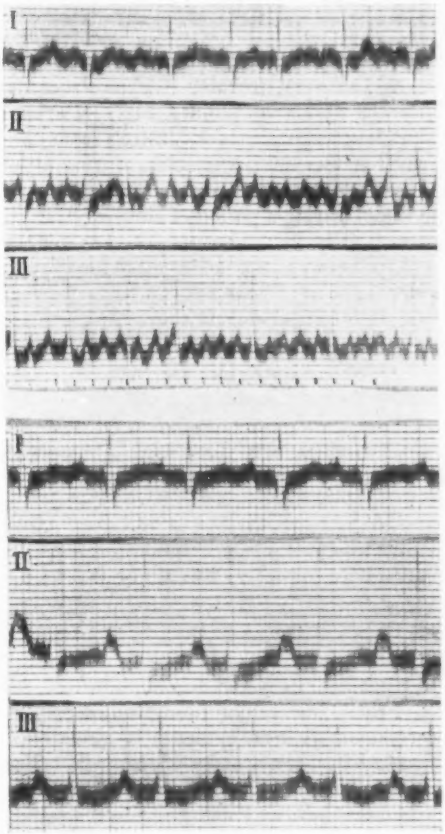


FIG. 2.—Case VII. Top: Taken during an attack after second admission to hospital. The ventricular rate was about 96 per minute. Bottom: Taken the following day after a sinus rhythm was established. The *PR* interval is about 0.2 second.

ment and was discharged from the hospital January 22, feeling fine. During this time she had had no more attacks of tachycardia.

She felt well until September, 1917, and was able to do light housework very comfortably. She was, however, short of breath on exertion. She contracted a cold at this time and a cough per-

sisted for several weeks. She became nervous again. The appetite was poor and she lost weight. She occasionally became nauseated and vomited. She felt so bad generally that she returned to the hospital in February, 1918. The physical findings were much the same as those on former admittance. The heart-rate was 80 and the rhythm was regular. On the following morning she became dizzy and faint and according to the nurse lost consciousness at one time. The intern was called. He found the heart-rate 40 per minute and the rhythm very irregular. An electrocardiogram taken on the same morning showed auricular flutter. During the next few days the patient had several attacks lasting from three to twelve hours. The rhythm was always irregular during an attack. The heart-rate gradually increased to about 100 per minute. An electrocardiogram taken during a period of sinus rhythm showed a prolonged *PR* interval (Fig. 2). The patient was very weak and at times irrational. She was unable to take food by mouth. She gradually improved the next few weeks and was discharged from the hospital May 27 in fairly good condition. Since this time she has occasionally seen Dr. Herrick at his office. She still has some symptoms of hyperthyroidism but has had no more attacks of cardiac irregularity to her knowledge.

8. *Paroxysmal auricular flutter, hypertension and cardiac asthma.* Mrs. M., white woman, aged forty-eight, married, entered the Presbyterian Hospital on Dr. Herrick's service March 3, 1920. She complained of high blood-pressure and attacks of dyspnea at night. She had been troubled with attacks of dyspnea during the night for about one and one-half years. They always appeared just at the time she fell asleep and lately had become so frequent that she got very little sleep. She had known that she had high blood-pressure for several years. She was short of breath on exertion.

Physical Examination. The head was negative. The pupils were equal and reacted to light and accommodation. Several teeth were missing and those that remained contained fillings and inlays. The tonsils were small with no evidence of infection. There was quite marked pulsation of the arteries of the neck. The lungs were negative. The apex impulse was just inside of the anterior axillary line in the sixth interspace and was heaving in character. There was a systolic murmur at the apex transmitted to the axilla. The aortic second tone was sharp and ringing. The rhythm was regular. The abdomen and extremities were negative.

Laboratory Examination. Blood: reds, 3,350,000; whites, 18,000; Hb., 45 per cent. Blood-pressure: systolic 206 and diastolic 122. Urine contained a trace of albumin at times and a few granular and hyalin casts. The Wassermann on the blood was negative. *X*-ray pictures of the teeth showed apical infection of two upper molars. These were extracted. The routine electrocardiogram (Fig. 3) showed the beginning of a short paroxysm of auricular flutter in lead II.

9. *Paroxysmal auricular flutter. Mitral stenosis and aortic regurgitation.*

Frank S., aged fifteen, messenger boy, visited the cardiac clinic of Rush Medical College in January, 1920. He complained of pain in the precordium, palpitation of the heart and rheumatism. He stated that the pain in the precordium was sticking in character and rarely lasted more than five to ten minutes at a time. It was always accompanied by palpitation. He had had four attacks in the last four years. The last attack appeared one month previous. He was short of breath on ordinary exertion.

Past History. He had a severe attack of rheumatic fever four years ago. He was confined to bed one month and many joints were involved. He had had three subsequent milder attacks.

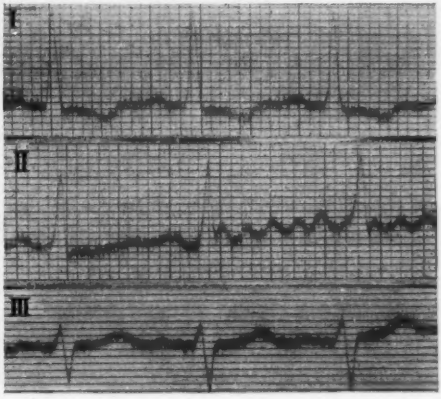


FIG. 3.—Case VIII. Lead II shows the beginning of a paroxysm of auricular flutter. The same ventricular rate is maintained. This attack evidently lasted only a few seconds, as lead III shows a sinus rhythm.

Examination. The eyes were negative. The tonsils were small and submerged. The teeth had been neglected and many were carious. The neck was normal. The lung findings were negative. The left cardiac border was 12 cm. from the midsternal line and the right border 3 cm. There was a rough presystolic murmur at the apex. A diastolic murmur was heard over the aortic area and to the left of the sternum. The pulmonic second tone was accentuated. The spleen was palpable. The reflexes were normal. The urinary findings and blood Wassermann were negative. An electrocardiogram (Fig. 4) taken the same day showed a peculiar auricular activity in lead III, which was though to be flutter. The ventricular rhythm remained regular in this lead and the rate the same as in the other two leads.

This patient has not returned to the clinic, but the social worker reports that he is well and able to work as a messenger boy.

10. *Paroxysmal auricular flutter. Chronic myocarditis, arteriosclerosis, hypertension, chronic bronchitis, bronchial asthma and emphysema.*

Mr. B., aged eighty-one, has been attending the Central Free Dispensary for various ailments, as chronic bronchitis, tonsillitis and rheumatism, for about ten years. During the last two to three years he has become more short of breath and was transferred to the cardiac clinic in October, 1919. At this time he was complaining of shortness of breath, cough, and wheezing in the chest.

Examination. The eyes were negative. The teeth were gone. The tonsils were small with no evidence of infection. The lungs were

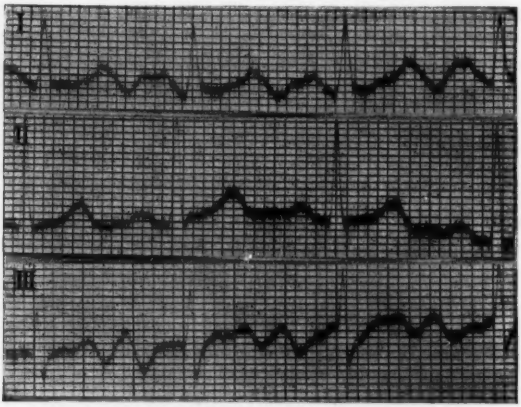


FIG. 4.—Case IX. Leads I and II are sinus rhythms. Lead III is apparently an auricular flutter with an auriculoventricular ratio of 3-1. The ventricular rate is 100 per minute and the auricular rate is 300 per minute.

emphysematous and sibilant rales were heard throughout. The left cardiac border extended to anterior axillary line. The tones were faint. A soft systolic murmur was heard at the apex and over the aortic area. The aortic second tone was accentuated. The rhythm was regular and the cardiac rate was 60 per minute. He had a bilateral inguinal hernia. There were no other abdominal findings.

The systolic blood-pressure was 180 and the diastolic 110 mm. Hg. The urine was negative.

On January 17 he was wheezing more than usual and was more dyspneic. The liver was palpable and tender. The cardiac rate was about 70 per minute and the rhythm was regular. The electrocardiogram (Fig. 5) showed auricular flutter. More rest was advised. The dose of tr. digitalis was increased from 15 to 20 m. three times a day.

At the next visit four days later his general condition had improved and a sinus rhythm had been established (Fig. 5), which has been maintained, according to our knowledge, ever since.

11. *Paroxysmal auricular flutter. Chronic myocarditis and angina pectoris.*

Mr. H., aged sixty, complained of a feeling of constriction in the precordium on exertion. The pain extended into the arms at times. This distress was always relieved by nitroglycerin. He was also short of breath on exertion. These symptoms had been present about two months and were gradually growing more severe.

He had had typhoid at the age of sixteen and rheumatism several times, but not in the last thirty years.

Examination. The physical findings were negative except for the heart. The left cardiac border was 12 cm. from the mid-

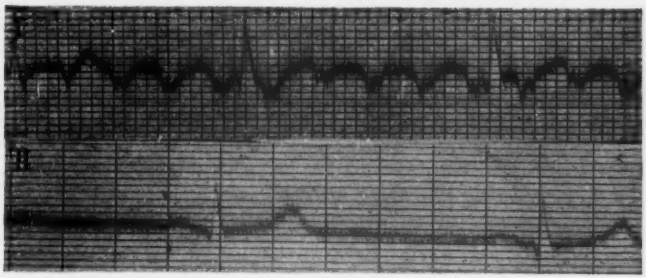


FIG. 5.—Case X. Top: Lead II shows an auricular flutter with an auriculo-ventricular ratio of 4–1. Bottom: Lead II, taken after the sinus rhythm had returned.

sternal line. A systolic murmur was heard at the apex. The aortic second tone was accentuated. There was an occasional premature contraction.

The systolic blood-pressure was 166 and the diastolic 85 mm. Hg. The urine and blood Wassermann were negative. The electrocardiogram (Fig. 6) showed an auricular activity suggestive of flutter in leads I and III. In lead II the auricular mechanism is different. The waves marked *P'* occur at regular intervals. If this is the *P* wave it differs from that in the same derivation shown at the bottom of Fig. 6, which is apparently a sinus rhythm. The electrocardiogram at the bottom of Fig. 6 was taken a few minutes later than the one shown at the top.

Summary of Cases. Brief histories of eleven cases are given in which paroxysms of an abnormal auricular action were discovered. In six instances it was auricular fibrillation and in five auricular flutter.

Those patients with auricular fibrillation were conscious of the onset of the attack. In three instances we observed the initial attack. In the other three the paroxysms had extended over periods of one, five and nine years respectively. Four had symptoms of

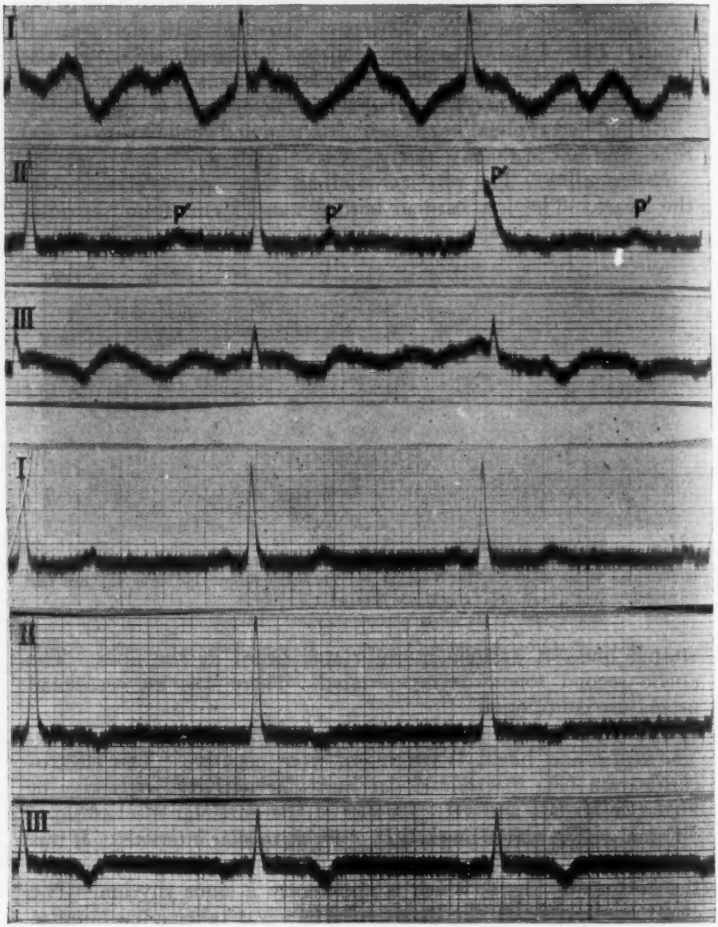


FIG. 6.—Case II. Top: Lead I is probably an auricular flutter. Lead III resembles lead I. Lead II is unlike the other derivations. The ventricular response has, however, remained regular. The wave marked *P'* occurs at regular intervals and may be a *P* wave. This wave, however, differs from the *P* wave in the same derivation in the electrocardiogram at the bottom of the figure, which is apparently a sinus rhythm. Bottom: Taken a few minutes following the electrocardiogram shown at the top.

myocardial failure. In one of these, however, the paroxysms antedated the appearance of other cardiac symptoms. In this case the attacks had been much more frequent since the onset of shortness of breath. Case No. 6 had two paroxysms of auricular fibrillation within a period of ten days in March, 1918. After this he was free from attacks until May, 1919. At this time gangrene of the right foot developed, the heart became decompensated and the auricles began fibrillating. The right foot was, however, amputated below the knee under gas anesthesia. Following the operation there was a period of more than two months during which the cardiac condition improved very slowly and stump did not heal. Later the cardiac compensation was restored, a sinus rhythm was established and the stump healed. The rhythm remained regular while the patient was quiet in bed. Upon slight exertion, however, the auricular fibrillation appeared again at times along with other signs of cardiac failure. Two had no cardiac symptoms other than the transient attacks of auricular fibrillation. In one of these the attacks had extended over a period of five years. The initial attack appeared at a time when he felt overworked. His general health later became improved and he was free for almost four years. During this time he worked very hard. He again began to feel tired and the attacks returned. In a recent communication he tells me that he rested for two months after seeing Dr. Herrick. During this time he felt better generally, was less nervous and was free from attacks. He began to work again and has since had a few attacks. The last patient had had attacks of rapid, irregular heart action for about one year. At the time she entered the hospital they appeared two or three times a week. While in the hospital some infected teeth were extracted and the diseased tonsils were removed. She has been free from attacks since this time. Her general health has improved and she feels better than she has in years.

The electrocardiograms of these patients were typically those of auricular fibrillation.

Five patients were observed during paroxysms of auricular flutter. One was conscious of the attack. In the remaining four the ventricular response was regular. In two of these the ventricular rate was 100, in one 75 and the remaining one 60 per minute. In each of these instances the auricular tachycardia was discovered accidentally. Each of the patients in this group had marked structural changes of the heart. One had in addition hyperthyroidism. All were short of breath. One had attacks of anginal pain.

The electrocardiograms of those cases considered as paroxysmal auricular flutter present some interesting features. The record of case No. 7 (Fig. 1) was taken during a cardiac attack in the fall of 1916. The ventricular response is irregular. In some cardiac cycles the auricular activity is suggestive of that of flutter, in others

that of fibrillation. The same patient had another attack in the winter of 1918. She felt faint and dizzy and at one time lost consciousness. The heart-rate was 40 per minute and the rhythm very irregular. An electrocardiogram taken the same morning showed auricular flutter. This record unfortunately was destroyed. The electrocardiogram in Fig. 2 was taken the following day. The ventricular rate was then about 96 per minute. Later when the sinus rhythm was established the *PR* interval was about 0.2 seconds (Fig. 2). Fig. 3 shows the onset of a short paroxysm of fine auricular flutter in Case No. 8. A normal ventricular rate and a regular rhythm were seemingly maintained during the attack. The top record in Fig. 5 is lead II of Case No. 10 taken during a paroxysm. At the bottom is the same derivation taken after the sinus rhythm had been established.

The electrocardiogram of Cases No. 9 and No. 11 are more difficult to interpret. In leads I and II of the electrocardiogram of Case No. 9 (Fig. 4) the ventricles are apparently responding to impulses formed at the sinus node. Lead III is apparently auricular flutter with an auriculoventricular ratio of 3 to 1. The same ventricular rate was maintained. Lead I of the electrocardiogram of Case No. 11 (Fig. 6) is seemingly a coarse auricular flutter. Lead III resembles lead I. In lead II, however, the auricular mechanism has changed, but the ventricular response remained regular. This derivation is unlike the corresponding one in the electrocardiogram at the bottom of Fig. 6 and is, therefore, probably not a sinus rhythm. The waves marked *P'* occur at regular intervals and may be *P* waves. If these are *P* waves, they are probably ectopic for they differ from those of the same lead after the sinus rhythm was apparently established. These changes in the auricular mechanisms were very fleeting. The two electrocardiograms in Fig. 12 were taken within ten minutes of each other.

Comment. *Clinical Significance of Paroxysmal Auricular Fibrillation and Flutter.* Paroxysmal auricular fibrillation and flutter occur in the same type of cardiac conditions. They are in the majority of instances discovered in individuals who have the clinical findings of a failing myocardium. These attacks frequently appear at the time of impending cardiac breakdown. They may subside as the cardiac reserve is improved or becomes permanent.

It is very probable that many cases of lasting auricular fibrillation and flutter are preceded by short paroxysms of these conditions. Three cases of mitral stenosis have recently been observed during the period of approaching cardiac failure, in whom the permanently established auricular fibrillation was preceded by one or more short attacks. One of these cases, No. 5, is included in this report.

In some instances paroxysmal auricular fibrillation and flutter are seemingly precipitated by extracardiac conditions, as focal infections about the mouth and hyperthyroidism. Case No. 3

has been free from auricular fibrillation since her infected teeth were extracted and the diseased tonsils removed. Case No. 7 has had no further attacks since the thyroid symptoms subsided. Case No. 6 was free from cardiac attacks for more than a year. Later gangrene of the right foot developed. Coincident with this auricular fibrillation appeared and continued until the leg was amputated and the stump healed. Blackford and Willius[1] report cases that recovered from auricular flutter following thyroidectomy. Willius[2] has observed patients with a sinus rhythm after thyroidectomy who had had, according to their history, an auricular fibrillation for more than a year. Barker and Richardson[3] describe a case which seemingly recovered from attacks of simple paroxysmal tachycardia and auricular flutter after the clearing up of focal infection about the tonsils and teeth and the removal of a portion of the thyroid gland.

In some of those patients in whom there are demonstrable extracardiac factors there may or may not be much evidence of cardiac disease. Even though the cardiac findings may be comparatively negative the appearance of these tachycardias should be considered as evidence in favor of structural changes in the heart. The longer these patients remain free from attacks after the removal of possible extracardiac factors, in the absence of other findings, the more certain we may feel that the cardiac changes are slight and not progressing.

The Relationship between Auricular Fibrillation and Flutter. Auricular fibrillation and flutter may occur in the same patient at different times. Lewis[4] reported eight cases of flutter and reviewed eight more from the literature. Thirteen of these patients had at some time had auricular fibrillation. In six one condition passed directly into the other. Some of these patients had been given digitalis. Robinson[5] describes a case in which auricular fibrillation and flutter alternated with each other several times. He was able in the dog to produce experimental electrocardiograms that resembled those taken of his patient during the periods of auricular fibrillation and flutter and the transition between these conditions. The electrocardiograms produced by faradization of the auricles resembled those of the transitional period in the patient. When, however, in addition the right vagus was stimulated the electrocardiogram was that of auricular fibrillation, whereas stimulation of the left vagus gave an electrocardiogram similar to that of auricular flutter.

Auricular flutter may in some instances be changed to auricular fibrillation by the administration of digitalis. Before the latter stage is reached the electrocardiogram may show cardiac cycles in which the auricular activity suggests that of flutter, whereas the next few cycles may be that of auricular fibrillation. The same type of electrocardiograms is occasionally produced by patients

who have not had digitalis (Fig. 1). Ritchie[6] believes that such electrocardiograms indicate a combination of auricular fibrillation and flutter. The same explanation has been more recently given by Schrumpf.[7] Lewis[8] emphasizes the close relation between the mechanism of these two conditions and publishes a curve from a dog in which auricular fibrillation was changed to flutter by vagus stimulation. He, however, does not believe in the simultaneous presence of the two disorders. This conception does not exclude the possibility of one mechanism changing to the other even at short intervals. That would possibly furnish a plausible explanation for some of the clinical electrocardiograms.

It is a pleasure to acknowledge my indebtedness to Dr. James B. Herrick for his suggestions and for the privilege of studying some of the cases covered in this report.

BIBLIOGRAPHY.

1. Blackford, J. M., and Willius, F. A.: Auricular Flutter, Arch. Int. Med., 1918, xxi, 147.
2. Willius, F. A.: Personal communication.
3. Barker, L. F., and Richardson, H. B.: Unusual Combination of Cardiac Arrhythmia of Atrial Origin Occurring in a Patient with Focal Infection and Thyroid Adenomata, Arch. Int. Med., 1919, xxiii, 158.
4. Lewis, Thomas: Observations upon a Curious and Not Uncommon Form of Extreme Acceleration of the Auricle, "Auricular Flutter," Heart, 1912–1913, iv, 171.
5. Robinson, G. C.: The Relation of the Auricular Activity Following Faradization of the Dog's Auricle to the Abnormal Auricular Activity in Man, Jour. Exp. Med., 1913, xviii, 704.
6. Ritchie, W. T.: Auricular Flutter, Edinburgh and London, 1914, p. 124.
7. Schrumpf, P.: Klinische Herzdiagnostik, Berlin, 1919.
8. Lewis, Thomas: The Mechanism and Graphic Registration of the Heartbeat, London and New York, 1920.

THE RELATION OF THE ENDOCRINE SYSTEM TO THE GLYCEMIC REACTION FOLLOWING THE INJECTION OF HOMOLOGOUS PROTEIN.

By G. L. Rohdenburg, M.D.,

and

O. Krehbiel, M.D.,

new york.

(From Columbia University, George Crocker Special Research Fund, F. C. Wood, Director.)

We have previously shown[1] that variations in blood-sugar concentration follow the injection of a relatively large number of substances, and that when proteins from different sources are

[1] Rohdenburg, Bernhard and Krehbiel: Am. Jour Med. Sc., 1920, clix, 577.

injected into rabbits,[2] the variations observed in blood-sugar concentration follow a definite course and occur concomitantly with the development of antibodies. Variations in the blood-sugar content of normal rats and mice injected with homologous and heterologous protein were also observed,[3] and in a small series of spontaneous malignant tumor-bearing mice a large proportion of the animals showed, in contrast to normal animals, no variations in the blood-sugar concentration when injected with homologous protein.

With the intention of investigating the hypothesis that the occurrence of tumors is due to some endocrine disturbance, we have studied the effect of ablation of one or more of the glands of internal secretion upon the glycemic reaction following the injection of homologous protein. As has just been stated, tumor-bearing mice and rats differ from normal animals in their reaction to the injection of homologous protein as shown by the blood-sugar content. If the removal of one or more of the endocrine glands bring about a condition in which injections of homologous protein are not followed by a glycemic reaction, and if absence of a glycemic reaction under these conditions be considered as giving evidence of a predisposition to neoplasia, then the condition underlying predisposition to neoplasia might be subject to further experimental analysis. The term glycemic reaction in this paper has reference only to the variations in blood-sugar concentration which follow the injection of homologous protein.

Albino rats were employed, 0.05 c.c. of blood being obtained from the tail vein after the animal had fasted all night, and the blood-sugar concentration was determined by the method of Epstein.[4] The animal was then injected subcutaneously with 0.05 c.c. of an extract of homologous protein. This protein was prepared by cutting the tissues of another animal of the same species into small fragments and extracting it in approximately three times its bulk of normal saline for a period of about ten minutes. Sterile precautions are not essential. The opalescent, bloody, supernatant fluid was used. One hour after the injection of the protein extract the blood-sugar value was again determined. In the experiments recorded in this paper, spleen was used, but other tissues are equally effective. While it is true that all tissues contain glucose or glycogen the amount of either of these substances in the fluid injected was so minute that it could not be chemically estimated nor qualitatively identified.

After an injection of homologous protein one of three things may happen to the blood-sugar: It may rise, fall or remain relatively or actually stationary. No explanation can be offered for

[2] Rohdenburg and Pohlman: Am. Jour. Med. Sc., 1920, clix, 853.
[3] Rohdenburg: Jour. Cancer Research, 1920.
[4] Jour. Am. Med. Assn., 1914, lxiii, 1667.

the fact that in some instances the injection of homologous protein is followed by an increase in blood sugar while in other instances it is followed by a decrease. It is possible that the injection is always followed by an increase, but that this increase occurs with different degrees of rapidity in different animals; it may be that the time interval is so chosen that from some animals blood is drawn at a phase when the blood sugar, after having increased, falls below the normal before again returning to its preinjection level.

Thus in Fig. 1, *A* represents the preinjection level, *B* the maximum rise, *C* the fall below the normal and *D* the return to the normal. If this curve be either stretched out or compressed, as in Fig. 2, where the time intervals are shown by the upright lines, it is at once evident that in those animals in which the entire

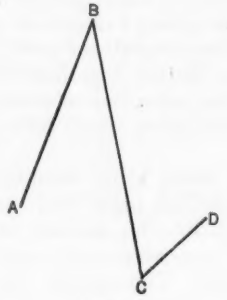


FIG. 1

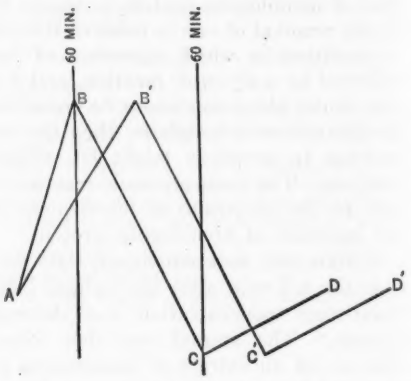


FIG. 2

reaction is over quickly we might easily get a lower value one hour after injection than in those in which the reaction takes a longer period for completion.

A variation between the first and second estimations of blood sugar of 16 or more mgm. when the Epstein method is used, or of 10 or more mgm. when the Meyers-Bailey[5] modification of the Lewis-Benedict[6] method is employed, has arbitrarily been defined as a positive glycemic reaction. Reversely a negative reaction is one which shows less than these variations. It is immaterial to our present problem whether the values rise or fall.

In previous publications[2 3] we have shown that the alterations in blood-sugar concentration following protein injection are not

[5] Jour. Biol. Chem., 1916, xxiv, 147.
[6] Ibid., 1915, xx, 61.

due to the excitability of the animal, to the operative procedure, to the influence of a few seconds of anesthesia or to the injection of 0.5 c.c. of normal saline solution.

It is impossible to obtain from a rat twice within an hour the amount of blood necessary for the Meyers-Bailey modification of the Lewis-Benedict blood-sugar method, and it was for this reason that the Epstein method was chosen. We have previously commented upon the limitations of the Epstein method for determining sugar values and have pointed out the possible sources of error. Whatever the error may be, however, it is common to every determination made by that method and in comparative estimations may be disregarded if the results seem well correlated.

When 0.05 c.c. of blood is used the Epstein method gives values which are extremely high and which do not represent the actual blood-sugar content of the rat, as shown by other procedures; the figures are therefore merely relative.

A check experiment will prove the truth of this contention. Five guinea-pigs were tested according to the method outlined in a previous paragraph, the blood being obtained twice within an hour from the heart. On the specimens thus obtained blood-sugar determinations were made according to the Lewis-Benedict and the Epstein methods, 0.05 c.c. of blood being used for the Epstein method. If the assumption made be correct, then an equal percentage of positive reactions should occur, irrespective of the method employed, the double standard of comparison being kept in mind. The blood-sugar values, however, would be much higher with the Epstein than with the Lewis-Benedict method. The observations, as is shown in Table I, are in accord with our premise.

TABLE I.

Epstein method.			Lewis-Benedict method.		
Zero hour.	60-minute interval.	Variation.	Zero hour.	60-minute interval.	Variation.
No. 1 440	408	−32	No. 1 138	132	−6
No. 2 448	433	−15	No. 2 132	126	−6
No. 3 416	528	+112	No. 3 162	212	+50
No. 4 504	489	−15	No. 4 150	126	−24
No. 5 472	496	+24	No. 5 153	165	+12

Percentage giving positive reaction: Epstein method, 60; Lewis-Benedict method, 60.
Averaged variation in mgm.: Epstein method, 40; Lewis-Benedict method, 20.
All figures indicate mgm. per 100 c.c. of blood.
+ = increase in blood sugar.
− = decrease in blood sugar.

The glycemic reaction may be estimated in two ways: by the percentage of positive reactions in a given group, or by the averaged variation in sugar concentration. If we judge only by the per-

centage of positive reactions, then we have no means of estimating the degree of reaction, for with the standard as laid down a variation of 20 mgm., which is but 4 mgm. higher than what we designate a negative reaction, has the same significance as a variation of 64 mgm. It seems more accurate, therefore, to use the averaged variation as a standard of comparison.

In a series of seventy normal full-grown, healthy rats the blood-sugar values were determined before and after injection of homologous protein. As a result of these examinations it was found that 73 per cent. of the animals gave a positive reaction and that the averaged difference between the determinations at the zero hour and at the sixty-minute period was 29 mgm.; this figure has been adopted as the variation in normal animals.

In our first experiments the reaction was studied in animals from which one internal secretory gland had been removed. The glands removed individually were the spleen, thymus, both testes, both ovaries, both adrenals, all entire, approximately 90 per cent. of the thyroid and embedded parathyroids and approximately 90 per cent. of the pancreas. There were six full-grown normal animals in each group; and, with the exception of the adrenal-free group, in which owing to the short life of the animals the examinations were carried out after twenty-four hours; from fourteen to one hundred and twelve days elapsed after removal of the gland before tests were made. In a second series of animals double ablations were performed in such rotation that all possible combinations were obtained. For example: testes-spleen, testes-thymus, testes-thyroid, testes-adrenal, testes-pancreas. In each of these groups there were six animals and the averaged time of testing after gland ablation was fourteen days, again excepting the adrenal-free group, which was tested twenty-four hours after operation. A total of 162 animals were used in the experiment.

The effect of the various gland ablations upon the glycemic reaction is presented in chart form. The solid color indicates the averaged variation in milligrams for each group of 6 animals, the double vertical line the adopted normal variation of 29 mgm.

It is interesting to note that ablation of the sex glands alone influences the glycemic reaction in a different manner in each sex; thus, removal of the testes slightly inhibits, while ablation of the ovaries slightly stimulates the reaction. The removal of the spleen with either set of gonads markedly inhibits the reaction, while excision of the thymus and testes or of the thymus and ovaries causes no change from the normal. Ablation of the testes and pancreas causes a marked stimulation of the reaction; but removal of the ovaries and pancreas brings about a directly opposite result, that is, inhibition. An analogous difference in reaction is noted when the gonads are removed with the thyroid, for with this combination in the male inhibition follows, while in the female stimu-

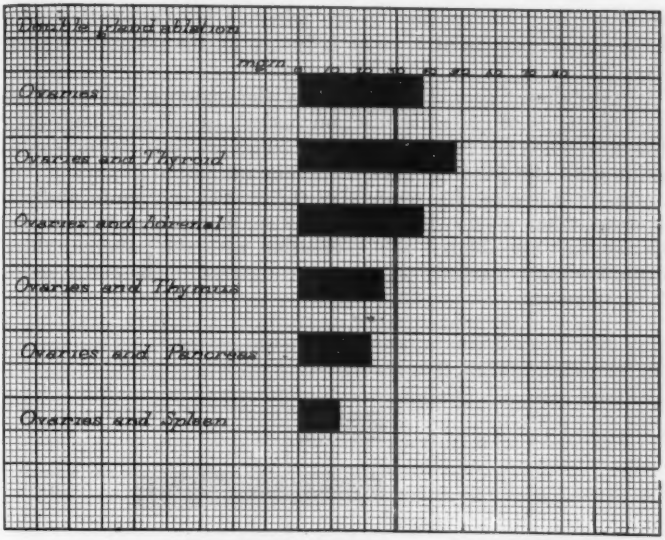


CHART I.

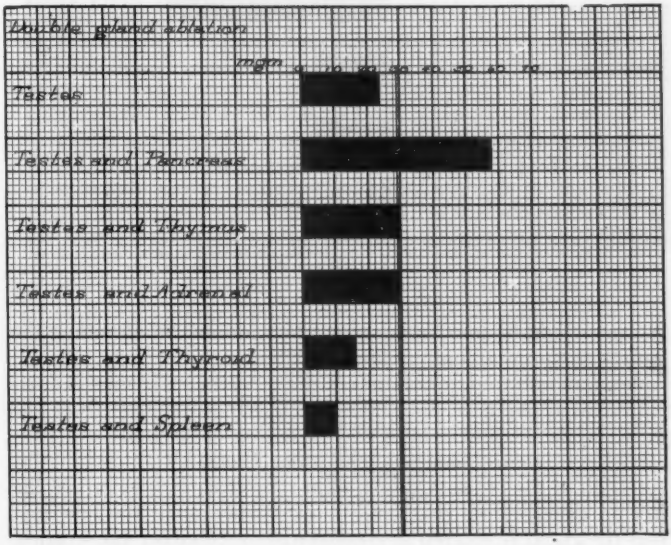


CHART II.

lation occurs. Extirpation of the adrenals in combination with the sex glands exerts little or no influence on the reaction (Charts I and II).

In rats almost complete removal of the pancreas has no effect upon the type of glycemic reaction under discussion (Chart III). However, when the thyroid, spleen or testes are removed in combination with the pancreas there is a very marked stimulation. In contrast to these results, removal of the ovaries or thymus and the pancreas shows a very slight inhibition of the reaction, while when the adrenals are ablated in combination with the pancreas there occurs the most marked inhibition encountered in the entire series of experiments.

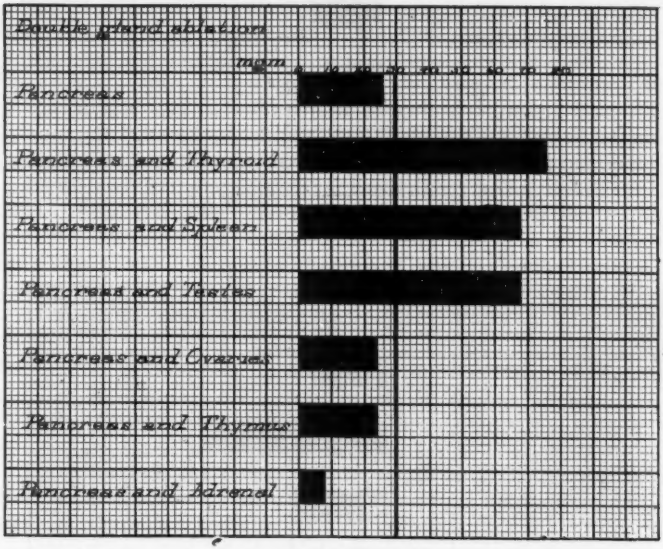


CHART III.

A very slight to moderate stimulation occurs when either the adrenals alone or a combination of adrenals with ovary, thyroid or spleen are removed. Ablation of either testes or thymus in combination with the adrenals shows practically no change from the normal, while, as previously stated, excision of adrenals and pancreas induces a most marked inhibition (Chart IV).

Excision of the thymus singly or in combination with either the testes or spleen exerts practically no influence upon the reaction. When the gland is ablated in combination with either the ovaries, adrenal, pancreas or thyroid there results a varying degree of inhibition, though it is not marked (Chart V).

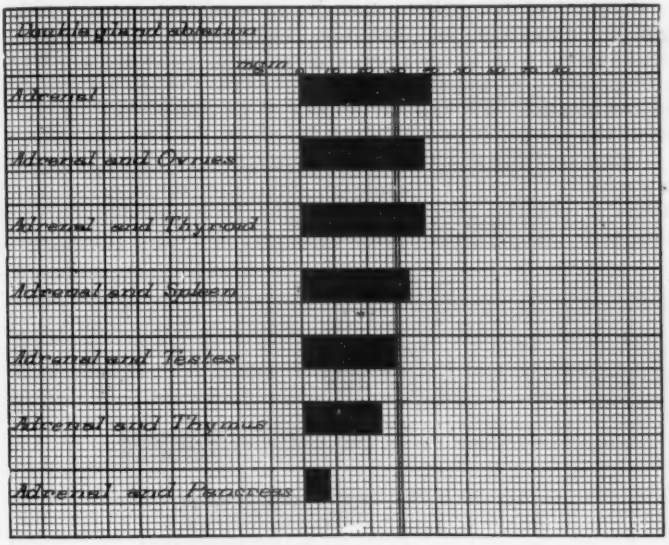


CHART IV.

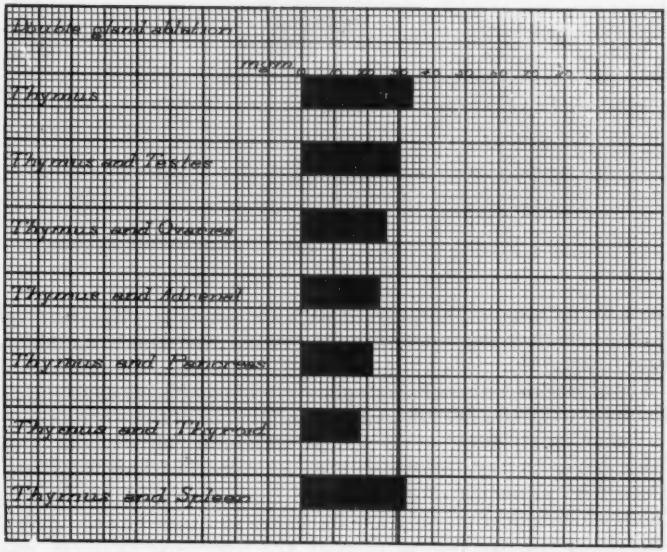


CHART V.

Removal of the spleen, alone or in combination with either gonad, induces a marked inhibition, while excision of the gland in combination with either thyroid or pancreas produces a marked stimulation. When either the adrenals or the thymus are removed in combination with the spleen there is no noteworthy variation from the normal (Chart VI).

Ablation of the thyroid, with such parathyroid tissue as may be embedded in it, results in a marked stimulation of the reaction and a similar condition prevails when the gland is removed in combination with the pancreas, spleen or ovary, and also, though to a

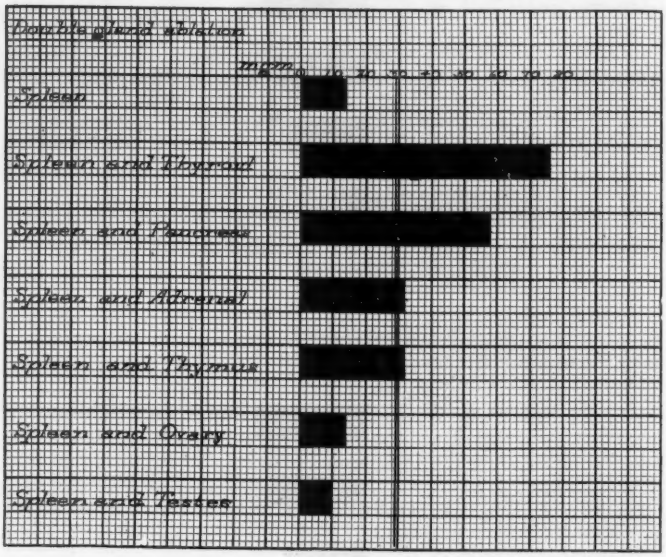


CHART VI.

lesser degree, when it is removed with the adrenals. The removal of the thymus or the testes with the thyroid gives rise to an inhibition (Chart VII).

The ablations, either of single glands or of combinations of glands which have thus far been described, result in one of three conditions: inhibition, stimulation or no change. Those which result in inhibition have, for easy reference, been collected in Chart VIII: the spleen with either set of gonads, and the pancreas and adrenals. Those which induce stimulation are shown in Chart IX: the spleen with either the pancreas or thyroid, the testes and pancreas, the thyroid and ovaries, and, finally, the pancreas and thyroid.

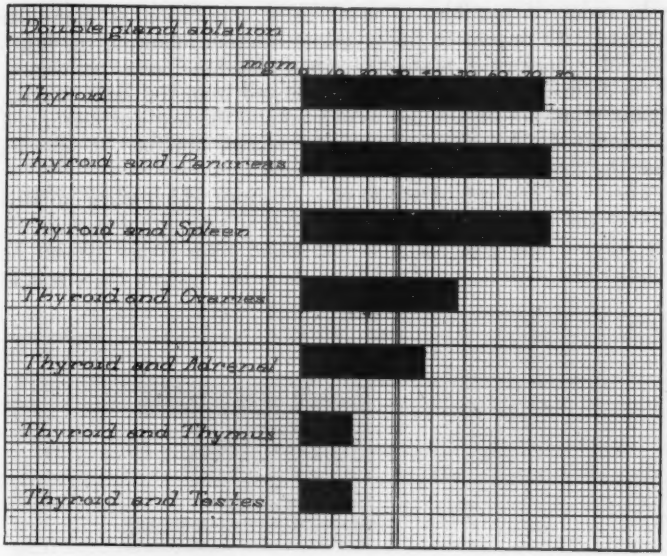


CHART VII.

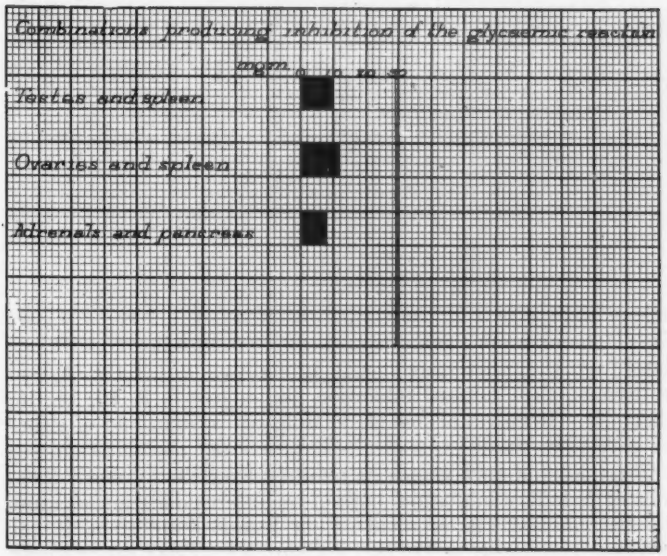

Combinations producing inhibition of the glycaemic reaction
mgm. 0 10 20 30
Testes and spleen
Ovaries and spleen
Adrenals and pancreas

CHART VIII.

In order, if possible, to establish a correlation of glandular activity with respect to the glycemic reaction following the injection of homologous protein, further ablations were performed, three, four and five glands being removed from the same animal. Again, groups of six animals were used and the test was performed as previously described. From the results obtained it appears that the connection is as follows:

There are two combinations of endocrines which when ablated inhibit the reaction; these are (1) spleen and either gonad set, (2) adrenal and pancreas. If one gland from either system be ablated and with it one gland from the other system, there results

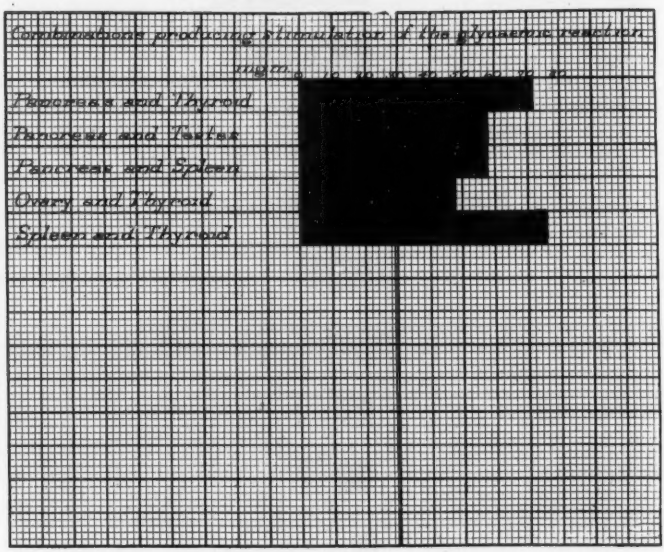


CHART IX.

little or no change from the normal reaction (see 1, 2 and 7, Chart X). If, however, one gland from one system be removed with one gland from the other system, and, in addition, either the thyroid or thymus, then marked inhibition occurs (see 5, 9, 10, 14, 15, Chart X). Removal of one gland from one system and of either the thyroid or the thymus results in practically no inhibition (see 4, Chart X). If both glands be removed from each system, then, in order to induce inhibition, both of the intermediate glands must also be removed, the removal of one intermediate gland is not sufficient (compare 3, 8, 11, 12, 13, Chart X). From this it would appear that there are two systems which control the reaction and

that these systems are connected through two apparently interchangeable glands, the thyroid and the thymus.

We have still to consider how inhibition may occur when the various glands are *in situ*, the data so far presented having to do with conditions following their removal. It is probable that if the removal of a gland causes inhibition, then that gland when *in situ* acts as a stimulator, and that the same thing holds true for various combinations. Furthermore, it is possible that inhibition of the reaction may be due either to lack of action of the stimulators or to excessive action of the inhibitors.

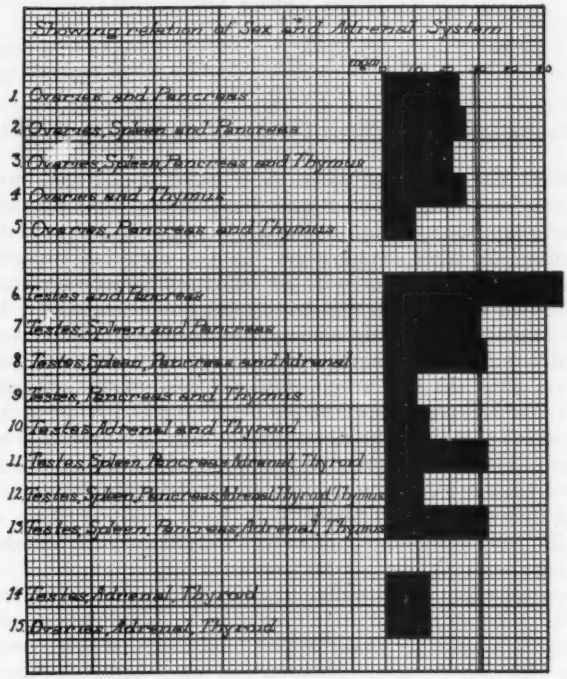

Showing relation of Sex and Adrenal System.
1. Ovaries and Pancreas
2. Ovaries, Spleen and Pancreas
3. Ovaries, Spleen, Pancreas and Thymus
4. Ovaries and Thymus
5. Ovaries, Pancreas and Thymus
6. Testes and Pancreas
7. Testes, Spleen and Pancreas
8. Testes, Spleen, Pancreas and Adrenal
9. Testes, Pancreas and Thymus
10. Testes, Adrenal and Thyroid
11. Testes, Spleen, Pancreas, Adrenal, Thyroid
12. Testes, Spleen, Pancreas, Adrenal, Thyroid, Thymus
13. Testes, Spleen, Pancreas, Adrenal, Thymus
14. Testes, Adrenal, Thyroid
15. Ovaries, Adrenal, Thyroid

CHART X.

The hypothesis that inhibition of the glycemic reaction following the injection of homologous protein may be an indicator of a state of predisposition to cancer, coupled with the demonstration that various combinations of gland removal bring about inhibition of the reaction, offers a wide field for speculation and suggests numerous other investigations. All that can, at the present time, be

stated as a result of the experiments here recorded is that the glycemic reaction, which follows the injection of homologous protein, appears to be under the control of the endocrine system and that inhibition of the reaction may be viewed as a disturbance of metabolism due either to hypoactivity or to hyperactivity of the endocrines. Whether this disturbance of metabolism is or is not of etiologic significance in neoplasia cannot be stated from the facts at present at our disposal.

THE LEUKOCYTES AFTER HEMORRHAGES.

By John H. Musser, Jr., M.D.,
PHILADELPHIA.

(From the Department of Research Medicine, University of Pennsylvania.)

During the course of some experiments undertaken for the purpose of studying blood regeneration after simple anemia, an unusual opportunity was presented for studying the behavior of the leukocytes after hemorrhage. In this series of experiments the total number of white cells per cubic millimeter were enumerated in some cases before and in all cases immediately after bleeding and a differential count made at the same time. Other counts, both differential and total, were subsequently made at various intervals after the first count until the white cells had reached the level of the preliminary determination or had attained figures which were approximately normal for the dog. Coincidental blood-volume estimations by the dye method afforded a basis for interesting comparisons. In a previous series of forty-eight dogs these normal figures had been found to be as follows: Average count of white cells per cubic millimeter, 15,923; average number of polynuclear neutrophiles, 66.66 per cent.[1]

Before discussing the results that were attained in the present series the literature of the subject will be briefly reviewed. It seems to be a quite generally appreciated fact that a leukocytosis occurs after hemorrhage. However, in most hematologies or in books dealing with laboratory studies in general this fact either is omitted, or if mentioned but brief mention is made of this occurrence. For example, Simon[2] merely lists in a long column, among the other causes of leukocytosis, that which follows hemorrhage. Webster[3] discusses the matter more fully than do other authors of

[1] John H. Musser, Jr., and E. B. Krumbhaar: Studies of the Blood of Normal Dogs, Folia Haematologica, 1914, xviii, 576.
[2] Manual of Medical Diagnosis, 9th ed., Philadelphia, 1918, p. 55.
[3] Diagnostic Methods, 6th ed., Philadelphia, 1920, p. 572.

standard books. He says: "A well-marked leukocytosis which may begin in from ten to fifteen minutes and may reach as high as 20,000 within an hour has been observed following extensive acute hemorrhage. The leukocytosis in these cases bears a general relation to the extent and rapidity to the loss of blood and usually disappears or diminishes long before regeneration of the blood has occurred. The leukocytosis is of the polynuclear type." He further states that Stassano and Bellow, in a reference unattainable, assume from their work that a hypoleukocytosis is observed after the loss of small quantities of blood. Drinker,[4] in his admirable article on the pathological physiology of blood cells holds: "There are few biological reactions which may be so fully relied upon as the leukocytosis following hemorrhage." Camus and Pagniez[5] write that there is an immediate drop of leukocytes following hemorrhage to be followed by a leukocytosis which is merely relative, as there has not been during the hemorrhage an outpouring of white cells comparable to the loss of red cells and plasma. They quote Inagaki as achieving the same results in his studies. Levison[6] writes upon the subject from the standpoint of differential diagnosis and calls attention to the fact that a leukocytosis is valueless in differentiating intra-abdominal hemorrhage from acute inflammatory lesions. Hoessli,[7] studying the blood of rabbits after hemorrhage, showed that the white cells were decreased in the first six to eight hours and subsequently there was a temporary increase in the neutrophiles. Govaerts,[8] working under Dépage, studied the white count after hemorrhage and called attention to the fact that a leukocytosis is the most valuable sign of occult hemorrhage. He states that it showed itself before there is appreciable diminution in the number of red cells. The leukocytosis attains its greatest height several hours after the hemorrhage starts and reaches normal in from forty-eight to seventy-two hours. Krumbhaar[9] studying the leukocytosis that occurs after operation and after a relatively small hemorrhage found that the leukocyte count began to rise after four or five hours, almost doubling in the first thirty hours and then gradually declining to normal in several days to a week. He noted also that there was a greater tendency to leukocytosis after external hemorrhage than internal. Drinker[10] and his co-workers, in their work on the

[4] Diseases of the Blood, Oxford Medicine, 1920, ii, 563.

[5] Action immediate de la saignée sur le nombre des leucocytes, La rétention leucocytaire, Compt. rend. soc. de biol., 1908, lxiv, 1149.

[6] Leukocytosis a Deception Sign in Abdominal Hemorrhage, Jour. Am. Med. Assn., 1915, lxiv, 1294.

[7] Leukocytose bei Intraperitonealblutungen, Mitt. a. d. Grenzgeb. d. med. und Chir., 1914, xxvii, 630.

[8] Etude de l'anemie posthémorrhagique chez les blessés, Ambulance de l'ocean, 1917, 1, 355.

[9] Observations on the Nature of Postoperative Leukocytosis in the Dog, Ann. Surg., 1917, lxvi, 133.

[10] The Factors Concerned in the Appearance of Nucleated Red Blood Corpuscles in the Peripheral Blood, Jour. Exp. Med., 1918, xxvii, 383.

influence of certain procedures to increase the rate of blood-flow through the blood-forming organs, state that they have frequently seen the white blood count double within two hours. This they say is a real increase in the circulatory white cells and not a change in the distribution of the cells, emphasizing the fact that the marrow is a reservoir of leukocytes, which in an emergency has the power to discharge the cells independently and rapidly. Nanta[11] after a study of twenty-five cases of severe hemorrhage says that there occurs a well-marked leukocytosis, influenced by other factors than the gravity of lesion. Binet[12] claims that during the hemorrhage the white cells are diminished, but their fall does not parallel that of the red cells. From this brief review of the literature of recent years it may be noted that confusion exists not only as to the actual occurrence of a post-hemorrhage leukocytosis but also as to the duration of this leukocytosis. For this reason it seems worth while to report the results of the white cell counts made upon animals in whom the quantity of blood lost could be accurately controlled.

Experimental Data.—Eight dogs were used in all. Two dogs were used in each experiment. After the bleeding from the jugular vein the animals were given the standard diet and all the water they wished after the counts were made. The first counts were made approximately four hours after the bleeding and succeeding counts were all made in the early afternoon before feeding. A Thoma-Zeiss pipette was employed in collecting the blood and a Levy slide was used in making the count. In the estimation of the various types of cells, smears were made on cover-slips and stained with (Romanovsky's) modification of Wright's stain.

In the first experiment two long-time splenectomized dogs which had been bled small amounts repeatedly for some weeks were bled 430 c.c. and 400 c.c. respectively. Each dog showed a sharp rise in total cells and a rise as well in the percentage of polynuclear granular cells. In the case of dog 19–4 the cells of the end of four hours had risen from 10,200 to 24,700, with an increase in polynuclears from 81 per cent. to 90 per cent. Dog 19–6 had an increase from 12,200 to 24,100 total leukocytes and a percentage increase of polygranular cells from 58 to 90. Both animals showed a drop two days later and both had secondary rises. The full results of the counts can best be seen in Chart I.

In the one animal the count returned to normal by the eighth day and in the other by the twelfth day. In the second experiment (Chart II) each of the dogs a long time splenectomized were bled a total of 525 c.c. and 675 c.c. respectively in two succeeding days. Here one dog, 20–4, had an increase of cells to 18,100 to fall at

[11] Les modifications précoces de la formule leucocytaire après hémorrhagie, Compt. rend. soc. de biol., 1918, xxxi, 103.

[12] Presse méd., Paris, 1919, xxvii, 217.

the end of two days to 10,200, around which figure they remained until the eighteenth day. The other animal, 20–5, had a leuko-

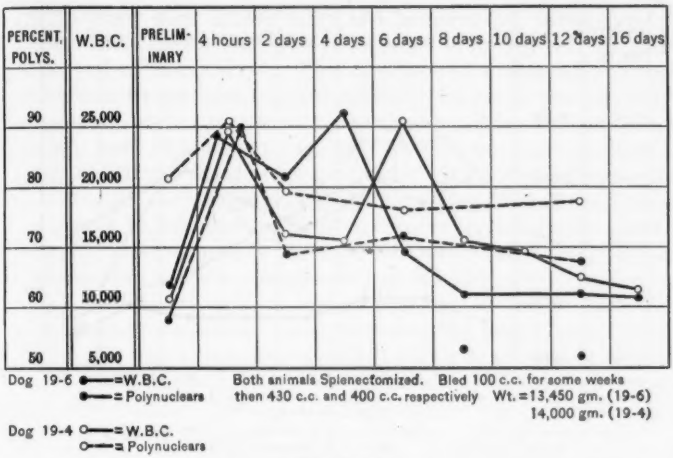


CHART I.

cytosis of 16,600 at the end of four hours, which increased to 23,600 in forty-eight hours and fell to normal by the twelfth day. Both animals had a polynuclear increase.

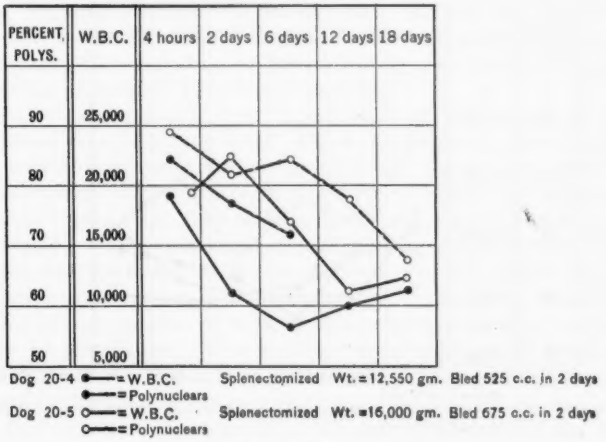


CHART II.

In the third experiment (Chart III) each dog was bled small amounts repeatedly and then several days before the first count 300

c.c., and on the day that counts were made 350 c.c. of blood were removed in the case of the larger dog and 250 c.c. from the smaller.

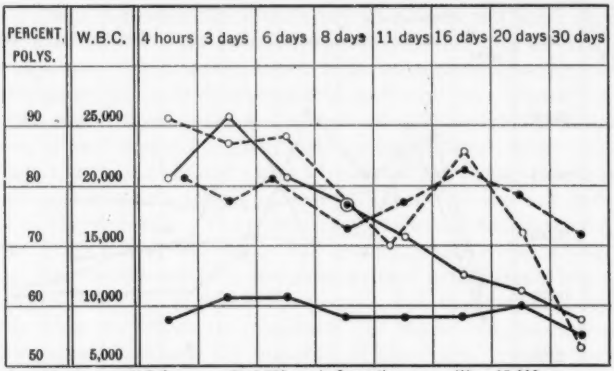


CHART III.

The large dog, 20–11, showed practically no change in his leukocyte count as the result of the hemorrhage. Eight counts made

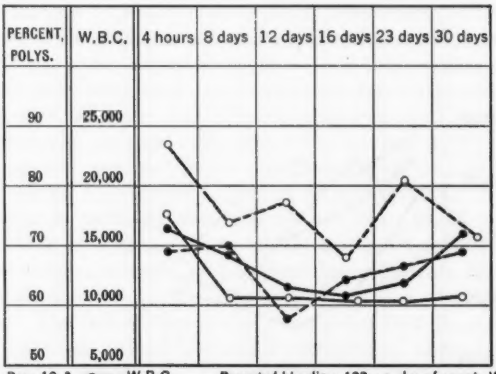


CHART IV.

over a period of thirty days showed a white count varying between 6400 and 10,800. The granular cells showed but a slight increase

after the hemorrhage. This dog showed no effect from the hemorrhage but was always active, ate well and seemed in the same good condition as the other animals. In the companion dog the leukocytes were 21,200 after the hemorrhage, three days later they were 25,900 and from this point gradually fell to 7800 at the end of thirty days. This dog showed a marked polynuclear increase, 94 per cent., which gradually fell to 73 per cent. by the twentieth day. In the last experiment (Chart IV) the effect of small loses of blood was studied. Two dogs that had been bled 100 to 150 c.c. weekly over a period of time were counted immediately after the withdrawal of 100 c.c. Dog 19–3 had a leukocyte count of 16,200 after the bleeding, twelve days later the count was 11,600, three counts in the next two weeks were about the same figures, but for some reason at the end of thirty days the count was 16,700, although no further bleeding had taken place. The polynuclear percentage closely followed the total count. Dog 20–12 had a leukocyte count of 16,600, which at the end of eight days was 11,200, approximately the same as in all subsequent counts of this animal. There was a considerable increase in the granular cells in this animal.

It is also of interest to note that at no time was there a disappearance of eosinophiles from the peripheral blood, as occurs in the leukocytosis of sepsis and which Simon calls the septic factor, as well as in various experimental conditions.

Discussion.—From the results of these experiments and from the review of the literature it may be seen that, as a very general rule, hemorrhage causes a leukocytosis. This is of importance not only in the diagnosis of internal hemorrhage, such, for example, as occurs after contusion of the abdomen, but also in the differentiation of various abdominal conditions.

It is of particular interest to consider the *pathogenesis* of this post-hemorrhagic leukocytosis. Other observers who have studied the condition advance various hypotheses: some as the result of experimental study, others from purely hypothetical reasoning. Levison[13] says that this phenomena is the result of temporary hydremia. This explanation does not seem adequate. Webster[14] writes that the condition is referable rather to the sudden outflow of lymph which occurs as a compensation for the loss of fluid than to the new production of cells, as this latter process does not take place for some time. This would seem to hold true if there was but one massive hemorrhage, but would not account for the rise in leukocytes that occurs even after repeated hemorrhage as shown by those present experiments. Drinker[15] assumes that the very rapid flow of tissue juice into the blood stream carries with it protein material foreign to the blood stream with a consequent

[13] Loc. cit. [14] Loc. cit. [15] Loc. cit.

leukocytosis. Krumbhaar[16] believes that the post-hemorrhagic leukocytosis, which does not become apparent for four or five hours, is due chiefly to the summoning of new and younger forms of polymorphonuclear cells from the bone-marrow under the influence of an unknown stimulant. In one of his charts a distinct leukopenia during the first hour has been recorded. The French school, as reflected by the writings of Binet and of Camus and Pagniez,[17] would seem to have advanced only a questionable and a partial explanation for the leukocytosis that occurs after hemorrhage. They contend that the lowering of the blood-pressure incident to hemorrhage permits the more readily adaptable sticky white cells to adhere to the vessel walls and thus to remain in the system to a greater extent than the red cells. This relative increase in the number of circulating leukocytes must presuppose a marked diminution in the amount of circulating blood, because blood counts are absolute, not relative, and without a considerable diminution in the amount of plasma there would be little change in the count of cells in each cubic millimeter. In the present study confirmatory evidence of this theory may be presented. In all the dogs studied when blood-volume estimations were made the leukocytosis was found to be the most marked in those animals in whom there was the greatest proportional loss in blood volume. Yet even these factors of retention of white cells plus diminished blood volume do not seem sufficient to explain the very great increase of circulating cells that frequently occurs. It would seem likely that a third factor plays the most important part, namely, the response of the organism to an injury, in some respects analogous to an infection, and the consequent outpouring of preformed leukocytes into the circulating blood from the bone-marrow for the most part and to a lesser extent from the spleen and liver, where they lie in readiness to respond to any call for their services by the body tissue.

Conclusions.—1. A marked leukocytosis is the general but not constant rule after hemorrhage, and is of variable duration. The persistence of the leukocytosis would seem to bear a general relation to the severity of the hemorrhage.

2. This leukocytosis is made up largely of an increase in the polymorphonuclear neutrophiles.

3. Eosinophiles do not disappear from the circulating blood as they do in the leukocytosis of sepsis and other conditions.

4. The factors which seem to play a part in the pathogenesis of the condition are: Retention of the leukocytes in the blood stream during hemorrhage by adhesion to the vessel walls with diminution of blood volume, and, presumably, an outpouring of white cells from the bone-marrow after hemorrhage in response to an unknown stimulus.

[16] Loc. cit. [17] Loc. cit.

POLARISCOPIC STUDY OF URINES OF A GROUP OF SYPHILITICS.

By S. P. Taylor, M.D., and K. P. A. Taylor, M.D.,
PHILADELPHIA.

(From Hospital of the University of Pennsylvania.)

Mettenheimer,[1] in 1858, first called attention to the existence of lipoid bodies seen under the polarizing microscope as globules showing a dark central cross separating four bright peripheral quadrants. Since that time many investigators have found these bodies in certain sputa, tuberculous pus and detritus undergoing advanced necrosis. It has been assumed that these bodies represent a more advanced stage than fatty degeneration and indicate an irreversible process. Considerable work has been done leading to some knowledge of the chemical and physical properties of these lipoid bodies. They are said to include cholesterin esters, fatty acids, sphingomyelin, cerebrosides and soaps of oleic acid. Lehmann has proposed the name of "fluid crystals" to designate these bodies intermediate between true fluids and true crystals.

Munk,[2] in 1913, found these bodies in certain urines studied in the appropriate method and first established a relationship of doubly refractile lipoids to syphilitic nephritis. He found them in cases judged clinically to be nephritis due to spirochetal infection. He also observed their less frequent occurrence in the urines of senile syphilitics without a true nephritis and also in tabetics and paretics.

Thus an impetus was given to closer study of syphilitic nephritis, as first reflected by the studies of Stengel and Austin,[3] the report of whose work appeared in 1915. These investigators studied a group of frank and severe nephritics. Their findings have been tabulated as follows:

	Total.	Lipoids in urine.
Nephritis with severe albuminuria:		
With syphilis	6	6
With syphilis doubtful	3	2
Without syphilis	14	5
Nephritis with little albumin:		
Some syphilitics	23	0

The conclusion reached was that the presence of doubly refractile lipoids in cases of severe nephritis does not imply syphilitic nephropathy, but that an abundance of them is highly suggestive thereof.

Cole[4] in a recent discussion of syphilitic nephritis did not take

[1] Am. Jour. Med. Sc., 1915, cxlix, 12.
[2] Ztschr. f. klin. Med., 1913, lxx, 1.
[3] Am. Jour. Med. Sc., 1915, cxlix, 12.
[4] Am. Jour. Syph., January, 1920.

into consideration the existence of these bodies in establishing the criteria for the diagnosis of this condition. This writer, quoting Fournier, claims that the following conditions must be met:

1. Proof of a recent luetic infection.
2. Symptoms of nephritis with lues.
3. Nephritis characterized by high albumin content in urine, rapid onset and tendency to early uremia.
4. Presence of spirochetes in catheterized urine.
5. Positive Wassermann.
6. Favorable influence of specific therapy.

Stokes,[5] of the Mayo Clinic, however, recently has reported a case of a syphilitic with nephritis, showing a heavy cloud of albumin and the presence in goodly numbers of these double refractile lipoid bodies. This patient failed to respond permanently to specific treatment. The nephritis was judged to be non-specific solely because of the failure of a therapeutic test. Response of a case to therapeusis he claims to be the court of last resort in determining whether the case is one of syphilitic nephritis.

The present study was instigated by the desire to determine whether the presence of albumin and casts in a large percentage of the urines of syphilitics might indicate a specific nephropathy. The urines of fifty syphilitics undergoing treatment in the genito-urinary dispensary of the University of Pennsylvania Hospital were subjected to this special examination. All patients were males, ranging in age from seventeen to seventy-two years, and in injections of neoarsphenamin from none to twenty-two. None of these patients evidenced any clinical signs of nephritis; 72 per cent., however, showed albumin in varying amounts; 44 per cent. showed albumin with casts, 56 per cent. had an excessive number of epithelial cells of undetermined type, and it is of interest to note that of these, 86 per cent. were of patients who had undergone rather intensive arsphenaminization. The centrifugalized urine sediments were viewed under a microscope to which was attached two Nicol prisms set at right angles to each other. None of these showed the double refractile lipoids.

Conclusion. The study of fifty proved syphilitics without manifest true nephritis failed to reveal the double refractile lipoids.

[5] Jour. Am. Med. Assn., lxvi, 16, 1191; Am. Jour. Syph., July, 1920.

NEUROGENIC IRREGULARITIES OF THE HEART IN ADULTS.

By Alfred M. Wedd, M.D.,
PITTSBURGH, PA.

(From the Rowe Memorial Electrocardiographic Laboratory, Mercy Hospital, Pittsburgh.)

Fluctuation in the activity of the sino-atrial node in children is well known and is regarded as an expression of instability of the incompletely developed nervous mechanism of the heart, and hence is without significance. Concerning sinus irregularity in adults, clinical opinion varies. According to Mackenzie[1] its presence indicates that the heart is healthy; the individual showing it is never conscious of the irregularity; certain neurotic individuals may show it late in life. Norris and Landis[2] state that its recognition becomes important mainly for the purpose of excluding serious forms of arrhythmia. Eppinger and Hess[3] consider all sinus arrhythmia occurring after the age of fifteen years a symptom of vagotonia, that having been defined as a functional autonomic system disease. In 1912 Windle[4] asserted that this irregularity had not yet been shown to occur in degenerative heart lesions. However, two years before, Stokes[5] reported a case of sinus arrhythmia associated with anginal attacks occurring in a woman, aged thirty-six years, who had had rheumatic fever when ten years of age and who showed signs of heart involvement.

On the other hand, Thorne[6] after observing cases of sinus arrhythmia in soldiers concluded that the presence of sinus arrhythmia, "which indicates an irregular cardiac dilatation," is not an absolutely normal phenomenon and that most people in whom this irregularity is present are more liable to suffer from a cardiac breakdown under mental or physical strain than those who have a perfectly regular pulse. Danielopolu and Heitz[7] assert that many clinicians have established a relation between weakness of the circulation and the presence of sinus arrhythmia, and they report three cases of respiratory arrhythmia in association with high systolic blood-pressure. In a more recent paper Aalsmeer[8] has

[1] Principles of Diagnosis and Treatment in Heart Affections, London, Oxford Press, 1916.
[2] Diseases of the Chest, Philadelphia, W. B. Saunders Company, 1917.
[3] Vagotonia, New York, Nervous and Mental Disease Publishing Company, 1917.
[4] A Note on the Diagnosis of Sinus Arrhythmia, Quart. Jour. Med., 1911–12, v, 326.
[5] Sinus Arrhythmia Associated with Anginal Attacks, Heart, 1910, i, 297.
[6] The Clinical Significance of Sinus Arrhythmia, Practitioner, 1916, xcvii, 274.
[7] Sur La Présence d'Une Arythmie Sinusale Chez Quelques Hypertendus, Arch. Mal. du Cœur, 1914, vii, 449.
[8] Over Sinus Arrhythmie, Nederland. Tijdschrift voor Geneeskunde, 1919, lv, 825.

reviewed the cases of Laslett, Wenckeback and Vaquez and Esmein in which marked sinus arrhythmia was associated with symptoms of cerebral anemia, and he cites the case of a young soldier with an apparently normal heart in whom a sinus arrhythmia occurred in a simple tachycardia. As the vagus and accelerator systems seemed to be functioning perfectly, he concluded that the cause of the arrhythmia was to be sought in changes in the reacting organ. He likewise says that respiratory arrhythmia cannot be regarded as a sign of a good heart.

In the early clinical literature sinus arrhythmia has been attributed almost solely to variations in vagal inhibitory tone, usually dependent on phasic respiratory changes. Lewis, however, has shown sinus arrhythmia in a normal child not of respiratory origin. Aalsmeer has argued for the possibility of heightened accelerator tone as a cause of the arrhythmia. That the pacemaker is controlled by a dual nerve supply has long been known, and in 1897 Hunt[9] presented further evidence for the view that the inhibitory and accelerator nerves are mutually antagonistic. Later the work of Cohn showed that the right vagus was limited for the most part to the sinus node, and Rothberger and Winterberg showed a similar distribution for the right accelerator. Thus it is obvious that the sinus activity at any moment is a resultant of the two oppositely acting sources of innervation and that the cause of variation may be one of four possibilities: an increase or a diminution of vagal tone; an increase or diminution of sympathetic tone.

But in cases of variation of sinus activity in man there seems to be no way to show conclusively in which system fluctuation occurs. The conclusion of Aalsmeer that if with the faster rhythm following exertion the arrhythmia disappears the sympathetic system works well and the vagus falls short is open to criticism, for when the accelerator nerves are severed in dogs exercise promptly causes as great an increase in rate as in normal animals. Applying this knowledge to man the increase in heart-rate following exercise is to be attributed to diminution of inhibitory tonus. That in cases showing excessive activity in either the vagus or sympathetic system the overactive system might be in unstable equilibrium which would cause an arrhythmia seemed at first an attractive hypothesis, but sufficient facts were not found to support it, especially the behavior under atropin. Sinus arrhythmia is frequently seen in hyperthyroidism, in which condition excessive sympathetic activity is at present believed to occur. Fig. 1 is an example. The average pulse-rate was 90 and the R–R interval varied between 0.6 and 0.82 seconds. Fig. 2 is from a patient suffering from an acute toxic goiter; during the slower rate of 70 the R–R interval varied between

[9] Direct and Reflex Acceleration of the Mammalian Heart with Some Observations of the Inhibitory and Accelerator Nerves, Am. Jour. Physiol., 1899, ii, 395.

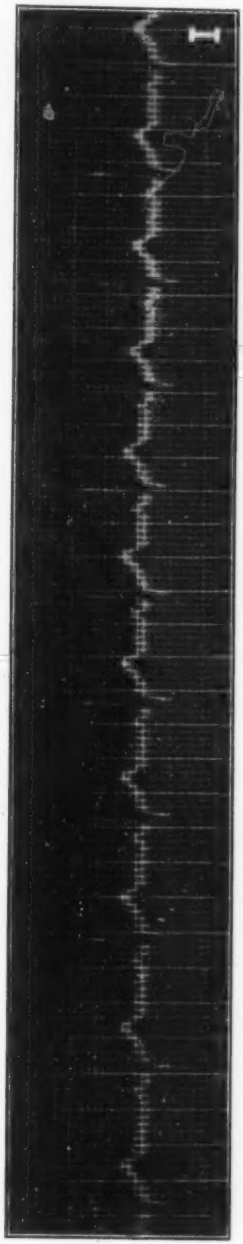


FIG. 1.—From a case of hyperthyroidism; average pulse-rate, 90.

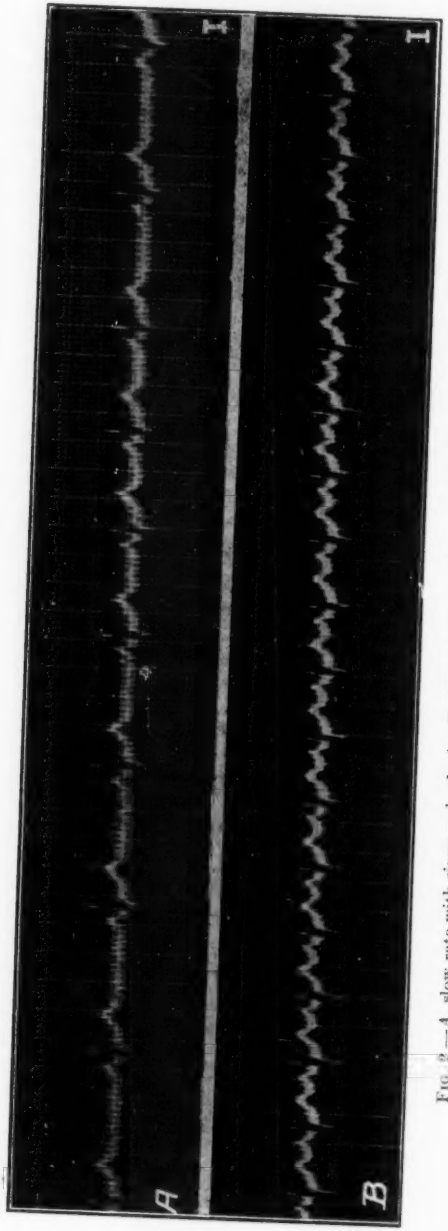


FIG. 2.—*A*, slow rate with sinus arrhythmia; *B*, simple tachycardia, rate 140; taken during an attack of palpitation.

0.6 and 1.04 seconds. Frequently attacks of palpitation occurred in which there was a simple tachycardia, with a rate of 140. Either as a result of diminution of vagus tone or an actual increase of sympathetic tone the accelerator system gained the upper hand, but no arrhythmia is present. Aalsmeer has also stated that sinus arrhythmia seen during a high rate after atropin is due to vagus influence. If such occurs after sufficient atropin to paralyze the vagi it would rather be due to fluctuation in accelerator tone. No example is available. It is customary to attribute the sinus arrhythmia seen in clinical conditions characterized by excessive vagal activity to fluctuation in inhibitory tone because the arrhythmia disappears after removal of vagus influence. However, one sees similar clinical pictures with vagus bradycardia but without arrhythmia. From the facts at hand the only tenable conclusion seems to be that sinus arrhythmia does not result directly from a preponderance of activity of either nervous system but is an expression of inequality of the antagonistic forces and is probably brought about by a periodic increase in the activity of the weaker system to restore, if possible, a more perfect balance. Such a concept is in a measure comparable to the familiar ventricular "escape" from prolonged vagus stimulation.

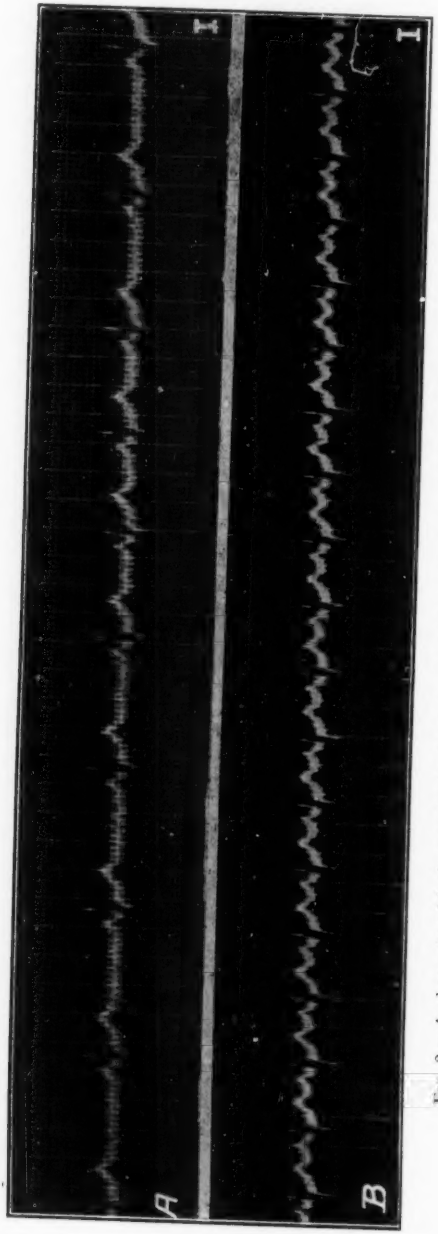
Knowledge of the factors which may modify accelerator tone is far from complete. Hunt regarded all cases of rapid heart action as due to diminution of activity of the cardio-inhibitory center and found no evidence that the accelerator nerves ever responded to reflex activity. But Hooker[10] has shown that when the heart is kept slowed by stimulation of the peripheral ends of the cut vagi various sensory stimuli would produce reflex acceleration. From the newer work of Cannon and others it would appear that in man reflex accelerator stimulation may be emotional or result from stimulation of sensory nerves.

Factors which may result in alteration of inhibitory tone are well known; the center may be acted upon by impulses from higher levels in the brain, impulses transmitted by various afferent nerves or by changes in the composition of the blood. All medullary centers are highly sensitive to changes in the H ion concentration; an increase causes stimulation of the inhibitory center. Reflex inhibition may result from stimulation of various sensory nerves or surfaces and the afferent fibers from the thoracic and abdominal viscera. The most important afferent nerves which affect reflexly the action of the heart, says Starling,[11] come from the heart and aorta itself. Einthoven[12] has shown electrical changes in the afferent fibers of

[10] May Reflex Cardiac Acceleration Occur Independently of the Cardio-inhibitory Centre? Am. Jour. Physiol., 1907, xix, 417.

[11] Human Physiology, Philadelphia, Lea & Febiger, 1915.

[12] On Vagus Currents Examined with the String Galvanometer, Quart. Jour. Exp. Physiol., 1908, i, 243.



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[11] Human Physiology, Philadelphia, Lea & Febiger, 1915.

[12] On Vagus Currents Examined with the String Galvanometer, Quart. Jour. Exp. Physiol., 1908, i, 243.

the vagus due to each heart-beat. Although the heart contains no true sensory nerves it is admitted by physiologists that in pathologic states impulses may arise in the heart which will result in sensations of pain, usually referred to the cutaneous areas supplied by the second and the third dorsal roots. That under certain abnormal conditions of the myocardium afferent impulses arising in the heart might bring about disturbances of the cardiac mechanism by altering the inhibitory tone would seem to be well within the range of possibilities.

Sinus arrhythmia is seen in a variety of clinical conditions. It frequently occurs following recovery from failure of the reserve force of the myocardium, and it is common after febrile diseases, especially those in which the heart may be affected, rheumatic fever, pneumonia, diphtheria. For years Mackenzie has taught that the presence of this irregularity after a febrile illness indicates that the heart has escaped infection because, he argues, irritation within the myocardium and apparent vagus activity are incompatible, since during the febrile state when a rapid rate is maintained the vagus is unable to assert itself. Such a theory assumes myocardial irritation as the sole cause for the rapid rate. It is obvious that the more rapid the rate, the less will be the opportunity for the occurrence of an irregularity; a fibrillation under atropin at a rate of 200 will appear surprisingly regular. On purely theoretical grounds sinus arrhythmia might be considered an expression of myocardial irritation, variations in the afferent impulses manifesting themselves in unstable inhibitory tone. As far as rheumatic fever is concerned, when one considers the frequency of involvement of the heart, the incidence being about 55 per cent., and that the cardiac lesion is seldom if ever purely valvular, it may well be that sinus arrhythmia indicates not that the myocardium has escaped infection but that an irritation is present which is able to assert itself.

Reflex cardiac disturbances arising in the alimentary canal are common. But even here there is the possibility that as a result of mechanical displacement by either distended or ptosed abdominal viscera the heart may be placed at a disadvantage or the coronary circulation embarrassed and thus become the seat of abnormal reflex activity.

Sinus arrhythmia due to vagotonia is usually associated with marked bradycardia, the pulse being from 60 to 40. These patients suffer from hyperacidity and spastic constipation and show excessive moisture of palms and soles, dermographia and the varied nervous and mental reactions characteristic of that syndrome. However, vagotonia will account for but a small part of the cases of sinus arrhythmia seen at this laboratory.

The occurrence of vagal irregularities in aortic disease is not

infrequent. Several illustrative cases will be cited later. Besides the usual sources of reflex vagal activity previously mentioned there remains the cardiac depressor nerve. This nerve was discovered by Ludwig and Cyon in 1866 and concerning its function in animals much is known. It is a purely afferent nerve which arises in the arch of the aorta. It contains two kinds of fibers, one of which causes reflex dilation of vessels and the other reflexly excites the cardio-inhibitory center. The fibers are carried in the vagus and the slowing is a vagus reflex which is abolished after division of those nerves. Arterial depression is a reflex by way of vasodilators. Bayliss,[13] using the string galvanometer, has shown that the nerve is excited at each heart-beat. Its function appears to be to protect the heart from too great a rise in blood-pressure. Sewall and Steiner[14] have shown that the depressors are highly sensitive to an increase of mechanical resistance to the action of the heart. Concerning abnormal functioning of the cardiac depressor in man in disease one can only speculate. But it is conceivable that in cases of pathologic changes in the aorta the endings of this afferent nerve may be the seat of abnormal impulse formation which will become manifest by disturbances usually regarded as purely vagal.

At the end of the paper may be found the histories of three adults, all past middle life, which present certain common features; each patient told of sinking spells or sensations of faintness or dizziness, and shortness of breath on exertion unaccounted for by any pulmonary condition; in each there was evidence of pathologic changes in the heart and aorta, and each showed a disturbance of cardiac mechanism due to abnormal vagal activity, the first, sinus arrhythmia, the second, partial atrioventricular block, the third, sinoatrial block. These irregularities are well known and all have been noted in hearts apparently free from disease and unassociated with any symptoms. It is not proved in these cases that the irregularity resulted in transient cerebral anemia which caused the sensation of faintness or loss of consciousness in one case, but in the search for the basis of symptoms such findings are worthy of consideration. The irregularities are regarded solely as manifestations of excessive inhibitory tonus, and it is the abnormal vagal activity which requires an explanation. To dismiss the question by saying that the affected individuals are "neurotic" is not justifiable in the presence of the physical findings. Neither psychic nor gastro-intestinal disturbances nor unusual sensory stimuli were present at the time the irregularities were recorded. The most apparent source for impulses that might result in abnormal vagal activity seemed to be in the heart or aorta in each case, and the afferent vagus fibers or the cardiac

[13] Principles of General Physiology, London, Longmans, Green & Co., 1915.
[14] A Study of the Action of the Depressor Nerve, Jour. Physiol., 1885, vi, 162.

depressor nerve provide the mechanism. The improvement following rest substantiates such a view.

The bearing of the irregularity on prognosis in such cases is problematical. The deciding factors would be the degree of dilation or relaxation of the aorta and the duration of the pause of the ventricle. The English cardiologists have called attention to the danger of premature beats in aortic disease and have found in the "compensatory pause" a possible explanation of sudden death. The same principle is involved in the cases described.

Summary. Certain facts concerning the regulation of the heart by the extrinsic nerves have been reviewed. The sinus node or "pacemaker" of the heart is under the control of the mutually antagonistic autonomic and sympathetic nervous systems, and its activity at any given moment is a resultant of these two forces. Sinus arrhythmia is an expression of imbalance between the two systems. Preponderance of either vagal or sympathetic tonus in itself such as is seen in vagotonia or hyperthyroidism does not necessarily cause arrhythmia. It appears that the irregularity results from periodic increases in the activity of the weaker system with the object of bringing about a more perfect balance.

In cases of vagal irregularities in adults it is important to determine the source of abnormal stimulation, and in considering the possibilities, it is to be remembered that the most important seat of formation of afferent impulses that may affect the cardio-inhibitory center is the heart and aorta. Just as in certain pathologic states impulses may arise in the heart which will result in sensations of pain, so it is believed that in other abnormal conditions impulses may form in the heart or aorta which, transmitted by the afferent fibers of the vagus or the cardiac depressor nerve to the inhibitory center, will become manifest as disturbances of the cardiac mechanism.

Three cases of vagal irregularities are cited, one each of sinus arrhythmia, partial atrioventricular block and sino-atrial block. In each there was evidence of pathologic changes in the heart or aorta, and the only apparent source of the excessive vagal activity was impulses which arose in those organs. Such irregularities occurring in aortic disease may be of prognostic significance as the combination of a prolonged ventricular pause and a relaxed or dilated aorta might result in a serious or even fatal cerebral anemia.

Reports of Cases.

Case I.—J. H., aged forty-eight years, formerly a cook in the navy, was admitted to the hospital on April 4, 1920, after suddenly having become unconscious and having fallen over while at work. He has had frequent attacks of what he calls giddiness. Shortness of

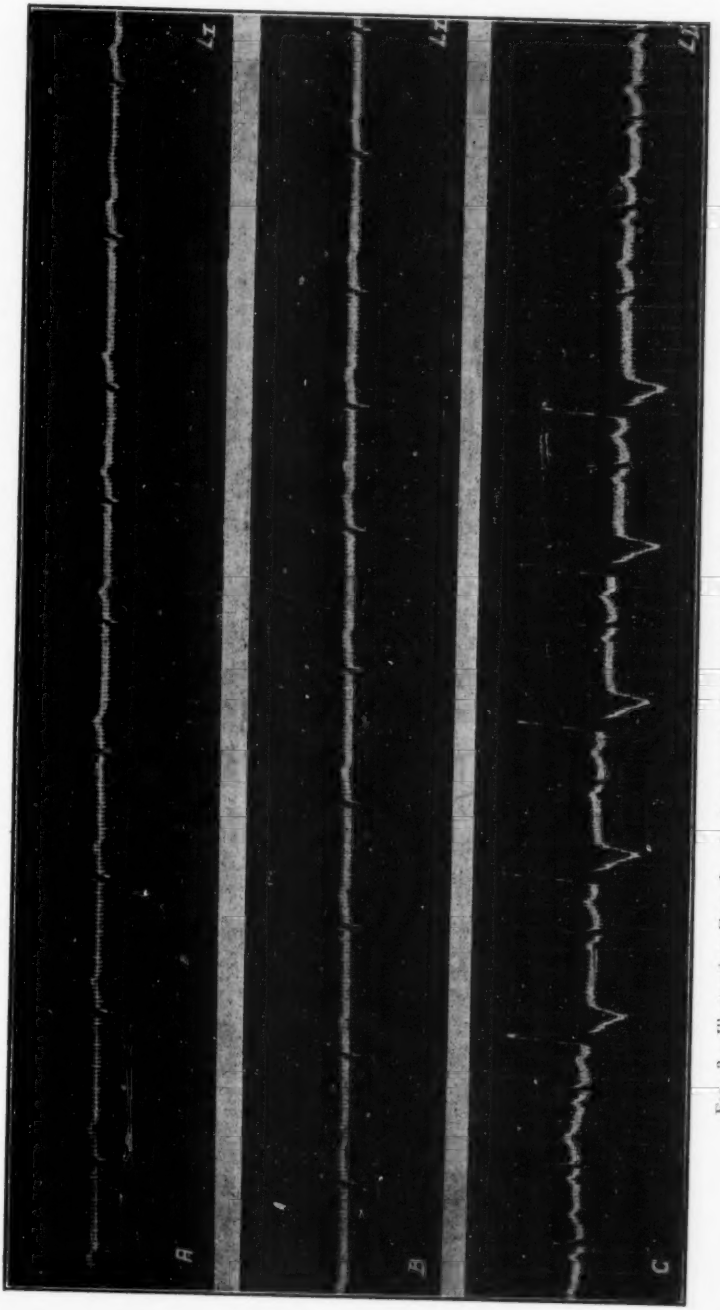

FIG. 3.—Illustrating Case I. *A*, first record; *B*, immediately after exercise; *C*, exercise three days later.

breath on exertion has been noticed for several years. He complained also of numbness in the arms and hands at times and of becoming easily fatigued.

The patient was a slender man of poor nutrition. The lips were cyanotic. Except for moderate emphysema the lungs were negative. The heart was not enlarged to percussion and the fluoroscopic examination showed a long, narrow heart; the aortic shadow was negative. At the apex the first sound was weak and the second sound was accentuated; at the aortic area a soft systolic murmur was heard and the second sound was accentuated and tympanitic. There was a marked sinus arrhythmia. Blood-pressure, 112–72. The palpable vessels were moderately thickened. The liver was palpable and tender. The extremities were cyanotic; the interossei and hypothenar eminences of both hands showed definite atrophy. The knee-jerks were hyperactive; the plantar response was normal.

The Wassermann reaction was negative and the spinal fluid negative, except the globulin test, which was reported two plus.

When first examined the heart-rate was 50 and the *R–R* intervals varied between 1.06 and 1.4 seconds. Exercise did not increase the rate and the arrhythmia remained unchanged. The almost complete disappearance of the "P" wave was doubtless also the result of vagal stimulation (Fig. 3, *A* and *B*). Following pressure on the right vagus a few right ventricular ectopic beats appeared, but there was no marked slowing, the longest pause recorded was 1.46 seconds. Left vagus pressure was without effect. The heart-rate increased to 78 and the irregularity disappeared following 0.02 gr. of atropin. After a few days of rest in bed the heart-rate increased to 70. The exercise test was repeated; this time there was a slight increase in rate, the sinus arrhythmia diminished and many ectopic beats appeared with several short periods of "coupled" rhythm (Fig. 3, *C*). The patient later resumed work in the hospital. The sinus arrhythmia persisted with an average of 80, and although the respiratory rate was 24, polygraphic records seemed to show that the irregularity was independent of respiration.

Case II.—Mrs. L., a woman, aged fifty-three years, first seen on January 21, 1920, described frequent attacks of sudden onset characterized by weakness, exhaustion, blurring of vision and a sense of sinking away; loss of consciousness, however, never occurred. At such times the pulse was said to be slow and irregular, and shortness of breath on relatively slight exertion marked. These attacks began two years ago, but during the past three months have been more frequent and the period of exhaustion lasts longer, necessitating rest in bed. There is occasionally slight "nagging" pain referred to the heart. Two years ago shortness of breath when walking up hill was first noticed. Four months ago swelling of the lower

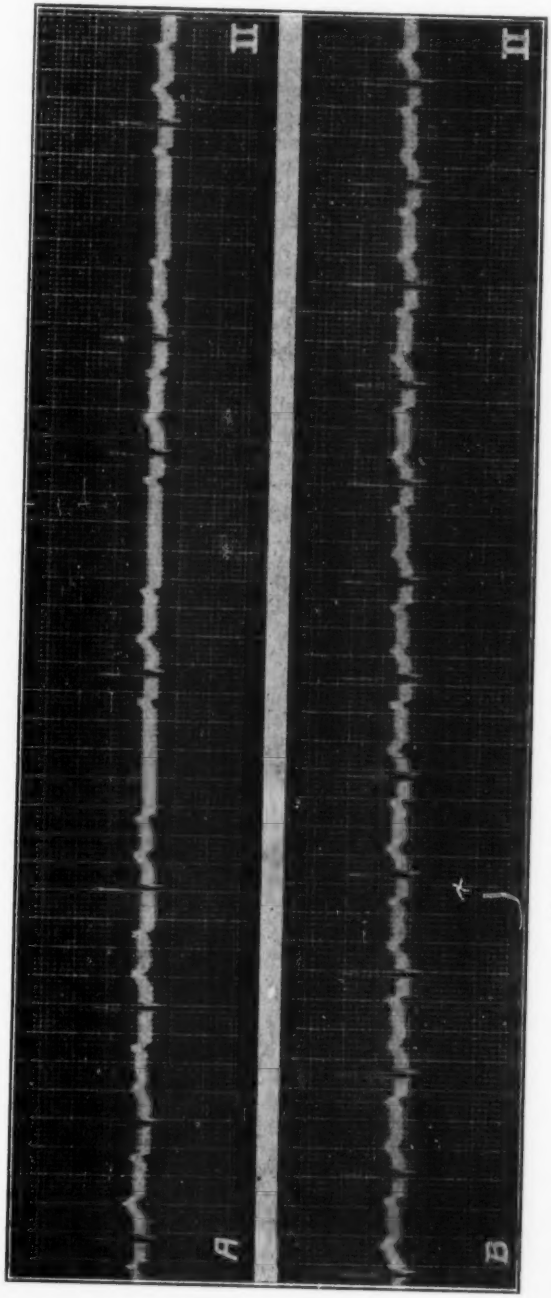

FIG. 4.—Illustrating Case II. *A*, first record; *B*, after atropin.

extremities at the end of day first occurred. Two months later she suffered from a severe attack of "bronchitis followed by congestion of the lungs."

History prior to two years is negative. In early life she had measles and scarlet fever. She has born seven children, and except for migraine attacks at the menstrual period her general health has been good. There is no evidence of syphilis.

The following are the salient facts in the physical examination: The patient was an obese woman of phlegmatic temperament. The lips were slightly cyanotic. There was no edema. The eyes were negative, except for sclerosis of the retinal arteries. The lungs and abdomen were negative. The reflexes were normal. The heart was not enlarged to percussion. The first sound at the apex was rather weak and was accompanied by a systolic murmur, not transmitted to the axilla. Over the aortic area and manubrium was heard a low-pitched, systolic murmur which was transmitted into the neck. The aortic second sound was accentuated and of a definitely tympanitic quality. The rhythm was irregular. Blood-pressure, 145–85. The peripheral vessels were moderately thickened.

The report of the roentgenologist stated: Slight degree of general cardiac hypertrophy. Aortic shadow broadened laterally. Aortitis of descending portion.

Electrocardiogram: Showed the irregularity to be due to partial heart block. There was usually progressive lengthening of the *P–R* interval through three or four successive cycles and then the impulses failed of passage and a ventricular beat was missed. Following 0.03 gr. of atropin the mechanism became normal, rate 86, *P–R* interval 0.2 seconds (Fig. 4, *A* and *B*).

After two days at rest in bed in the hospital the mechanism was normal and remained so during the period of observation.

Case III.—Mrs. Y., aged sixty-one years, was first seen on November 3, 1919. For the past two years following "ptomain poisoning" she has noticed that her heart missed beats, and during the past year after an attack of influenza she has been subject to sinking spells which often came on after eating or after exertion. Loss of consciousness has not occurred. For some time she has suffered from agorophobia and avoided assemblies and even shopping, apparently because of a fear of fainting. She has palpitation at times and shortness of breath on exertion and indefinite pain which she said suggested the presence of glass in the heart.

Examination showed a very large heart, the apex being beyond the anterior axillary line. The aorta was somewhat broadened. At the apex the first sound was of a dull character and accompanied by a short murmur. At the aortic area was a short rough systolic murmur and the aortic second was accentuated and definitely tympanitic. The blood-pressure was 125–70.

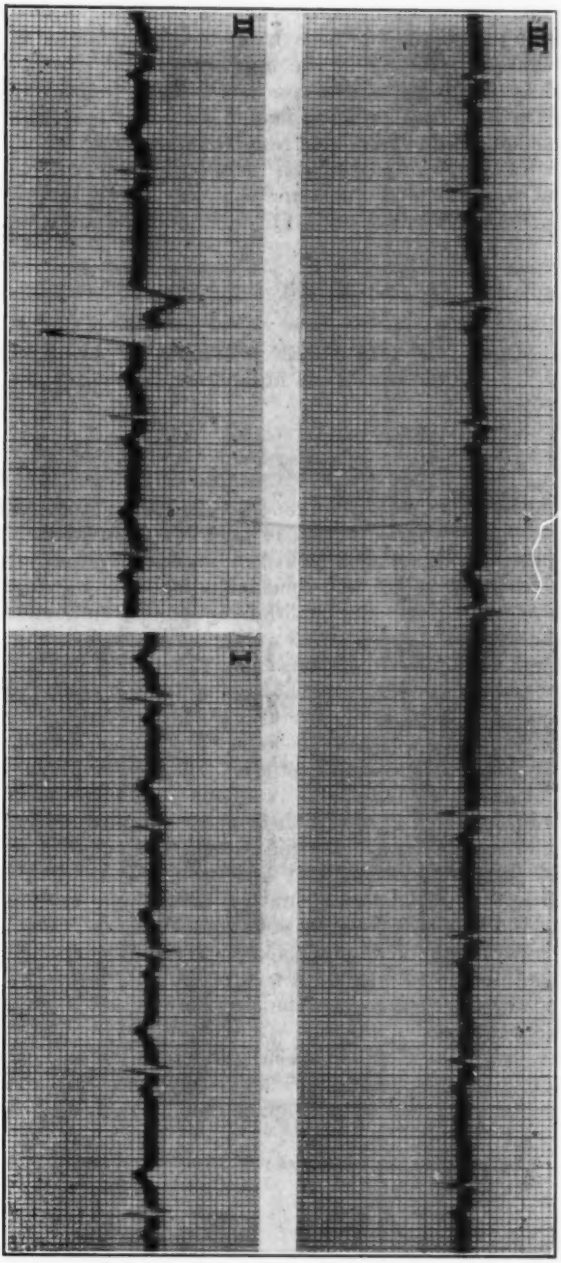

FIG. 5.—Illustrating Case III

The electrocardiogram showed sinus arrhythmia; sino-atrial block, with a pause of 1.36 seconds from which there was an escape by an impulse originating in the upper junctional tissues, and occasional ectopic beats which arose in the right ventricle. The block occurred at irregular intervals and neither it nor the sinus arrhythmia appeared to be related respiration (Fig. 5).

This patient has been seen several times during the year. Each subsequent visit was after a rest and she was clinically improved. The sino-atrial block was observed only at the first examination.

AN EVALUATION OF THE ALLEN METHOD OF TREATMENT OF DIABETES MELLITUS.[1]

By John R. Williams, M.D.,
ROCHESTER, N. Y.

Before the year 1915 a quite different method of treating diabetes mellitus prevailed than has since been employed. This change in method, which must be looked upon as an improvement, owes its inception to the experimental work done on dogs by Frederick M. Allen, and since confirmed by studies on humans by Allen and a number of independent workers. Among other things, Allen showed that diabetic patients could be rendered urine sugar- and ketone-free by the withdrawal of food, by fast days, and periods of underfeeding. Previous to this, other workers including Geulpa, had combined fasting with various dietary procedures, but all such work lacks the basis of scientific study. Their observations were largely clinical and uncontrolled.

Prior to 1915 the treatment of diabetes consisted chiefly in restricting the intake of carbohydrate foods, substituting for the loss occasioned thereby, additional fat and proteins. Methods were largely conjectural. Particular curative virtues were ascribed to certain foods which later investigations do not warrant. Oatmeal, skimmed milk, potato, sour milk, maple sugar and other special food cures are still in our memories. A host of drugs, ferments, animal extracts and mineral waters have similarly been exploited and have been found wanting.

Furthermore, clinical observations and statistics on diabetes made prior to 1915 are unquestionably grossly inaccurate. It has been commonly assumed by physicians that an individual whose

[1] Presented before the Pittsburgh Academy of Medicine, Pittsburgh, Pa., April 27, 1920.

urine would reduce a copper solution under certain conditions had diabetes. It is now well known that reducing substances other than sugar are found in the urine and that the presence of sugar in the urine is not conclusive proof of diabetes. At least 10 per cent. of the cases referred to my clinic as having diabetes are found not to have this malady. When reducing substances other than glucose are found in the urine in considerable amount, they lead to confusion in diagnosis. During the past year I have carefully examined 480 new cases presenting various medical problems with the following result:

Of 480 cases examined, 250 patients, or 55 per cent., had no urine sugar. 106 patients, or 23.2 per cent., were diabetics. 100 patients, or 21.8 per cent., had sugar or other reducing substance in the urine.

Of these 100 patients who had a reducing substance in the urine, 8 had blood sugars of 0.15 per cent. or higher; 8 had blood sugars between 0.12 per cent. and 0.15 per cent.; 84 had blood sugars between 0.07 per cent. and 0.12 per cent.

Of the 100 cases which had reducing substances in the urine, several were excreting glycuronic acid, others were eliminating animal sugars, a number of cases have renal diabetes and a fourth group are patients affected with low-grade chronic infections in which traces of sugar are often found in the urine. This entire question is reserved for a separate study and will not here be further discussed. Reference to it is made because unquestionably many of the alleged cures from diabetes attributed to medicines, ferments, pseudo-scientific mechanotherapy and religiopsychologic methods, are effected on patients who belong in this group and who have not true diabetes. Furthermore the statistics of the older scientific workers are undoubtedly diluted and vitiated by the inclusion of such cases.

Since 1915 the older clinical methods of studying the metabolism of the diabetic have been supplemented by blood chemistry and studies of the respired air. Moreover the necessity for accurate control of food intake has been realized. Accordingly the clinical observations of workers in this field during the past five years are much more accurate and trustworthy.

What is now known as the Allen treatment really represents the composite ideas of a number of workers. As first employed, patients were fasted until the urine was free from sugar. Food was then cautiously added until glycosuria reappeared. This was followed by a fast and the process repeated more cautiously until a point was found where, if possible, the patient would remain urine sugar- and ketone-free. The next step in the evolution of the treatment was the discovery that the incautious use of fat was responsible for many of the failures. The most recent and important improvement, in

my judgment, was the discovery that to really improve the food tolerance of a patient, one must restrict the diet to the point where the blood becomes and remains approximately normal as to its sugar content.

To summarize the principles involved in the present method, it is assumed that every diabetic—

1. Has a limited total food tolerance.
2. He has a limited carbohydrate tolerance.
3. He may in addition have a special intolerance for fat and protein.

The method of study employed in my clinic has been along the following lines: On admission, in addition to a physical examination, a careful routine chemical study of the blood is made, supplemented by a Wassermann test and cell examination. In this study the blood sugar, urea, creatinin, cholesterol and blood bicarbonate are determined. Whenever any of these elements are found in abnormal amount the blood test is repeated at intervals of two or three days. In actual practice this means that, as a rule, the blood sugar only is determined every second or third day during the patient's average three weeks' stay in the hospital. The urine is examined daily, but patients rarely show sugar after the third or fourth day. The food intake is regulated with great care on the basis of the blood-sugar level. The diet is kept low until the blood-sugar level becomes normal. Food is added cautiously while the blood-sugar level remains within normal limits and is reduced in amount when the level becomes high. Fast days are rarely used. Rest days in which the diet is reduced one-half or one-third are employed instead. Supplementing these scientific observations the patients are taught by various means and devices the elements of food chemistry, so that they may know without reference to books or charts the foods that are safe for them to use. They are also taught the approximate weights or quantities which are permissible.

Instruction is also given in the preparation of food and in matters of personal hygiene. In the diet kitchen we are experimenting with special dishes and foods. For example, we have developed a method of making a good soy-bean flour and also a flour from casein at a great saving to the patient. Ordinary pork and beans are proscribed in the diet of the diabetic, but we have developed a method of preparing pork and beans, with tomato sauce, which is perfectly safe and which compares favorably in flavor with the well-known commercial preparations of navy beans.

Our unit for the study and treatment of diabetes consists of scientific laboratories, a special diet kitchen, a room for the instruction and entertainment of patients and a group of eleven bedrooms. The unit has been in operation since 1915. From the very first

we have made an effort, by follow-up letters and by having them return for examination, to keep in touch with patients after they have left the hospital.

All kinds of patients have been treated, the courageous and the cowardly, the enterprising and the slothful, the attentive and interested, and the indifferent. These types are mentioned because the character of the individual has much to do with the outcome. To successfully contend with diabetes a patient must not only be wisely advised, but he must also possess courage and a willingness to learn and assist, to create new dietary habits and eliminate old ones.

All of the foregoing is what we now call the Allen treatment. The question which first presents itself to the new diabetic is, "Is it worth the sacrifice and effort?" This must be the question uppermost in the minds of physicians in general practice who see only an occasional case. There is not the slightest doubt about the immediate value of the treatment. No procedure in medicine of which I have knowledge gives more spectacular relief than does the institution of this method in the acute stages of untreated diabetes. I have witnessed many patients, practically moribund, temporarily saved from impending coma and death by its use. The ultimate value of the treatment has yet to be determined. Since I have had the good fortune to treat patients along the most approved lines since it was first proposed and have had a large number of cases constantly under observation, I shall try to answer the following questions:

1. Does the method ever restore the diabetic to health with power to use unlimited quantities of food?

2. Can severe cases always be kept from failing by rigorously following the method?

3. Does the method of undernourishment improve the physical condition of the diabetics enough to make the sacrifice and expense worth while, or does it merely increase or prolong the misery occasioned by the disease?

4. Does the use of the Allen treatment add materially to the expectancy of life of the diabetic?

To the first question as to the possibility of a complete cure and the use of an unlimited diet the answer is that it is highly improbable. I have seen several mild cases apparently become able to eat temperately of all kinds of food, even cane sugar. One case in particular was that of a physician who on admission had a blood-sugar level of 0.25 per cent. on a slightly restricted diet. At the present time, and after a lapse of three years, his blood sugar is normal and he is eating a general diet, including cane sugar, although it should be admitted that his eating habits are temperate. Many mild cases, particularly adults, have gained so much in tolerance that they are able to eat with discretion all kinds of ordinary foods

except cane sugar. I have never seen severe cases make such notable gains.

In answer to the second question as to whether or not severe cases can be kept from failing, it may be said that many can be kept alive, although it may be necessary to constantly readjust and maintain the diet at levels exceedingly low. For example, I have had such a case in a young man whom I am treating jointly with Dr. Allen. His diet is rarely permitted to go above 650 calories. I have had bad cases live for more than two years on diets averaging below 700 calories. A certain number of cases will succumb in spite of all fasting and underfeeding, as will be seen in tables exhibited later.

The third question as to whether or not the condition of severe patients is improved sufficiently to make the undernutrition ordeal worth while, I think can truthfully be answered in the affirmative. If patients properly regulate their daily activities so as not to exhaust themselves they can live with a fair degree of comfort and with greater freedom from symptoms for a much longer time than if treated by any other method of which I have knowledge.

The fourth question as to the gain in expectancy of life is a very difficult one to answer in terms of precision, and for several reasons. In the first place one must compare a given set of cases treated by the method with a similar group treated by older or former practices. To do this with any assurance of accuracy is quite impossible. (*a*) Included in all former studies on diabetes as before mentioned, because of inefficient methods of investigation, there must be many cases, particularly those of mild or uncertain form, which were not true diabetes; (*b*) there is great variation in the severity of diabetes in different individuals and a corresponding variation in prognosis; therefore, only cases of similar degrees of severity can be fairly compared; (*c*) a large proportion of diabetics have complications or associated diseases which are frequently the cause of death; obviously only groups of cases of uncomplicated diabetes can be compared.

Secondly, a large proportion of those who succumb to diabetes under the Allen treatment are not faithful to the method, as shown by the appended tables. Most of them are unwilling to continue under limitations and privations which it imposes and rarely follow it for more than a few weeks.

In spite of all these disconcerting factors, from careful observation one gains a distinct clinical impression that life is materially lengthened by the treatment. Curves plotted so as to show the average duration of life of fatal cases arranged according to age of onset and duration of disease between 408 fatal cases treated by Joslin[2] prior to December 1, 1915, and 103 fatal cases treated by me since 1915,

[2] Joslin, E. P.: Treatment of Diabetes Mellitus, Lea and Febiger, 1917, p. 36.

show that life has been prolonged from one to two years in most of the age groups.

Children when seen at the onset of diabetes, even when severely ill, may be greatly relieved for several months, oftentimes for upwards of two years. There may be noted, however, a gradual decline in the ability to use food. If the diet be constantly reduced to keep the blood sugar within normal limits, the child will get along fairly comfortably for several months more, provided it does not succumb to some other disease or until trophic disturbances and evidences of malnutrition become distressing. Even under these conditions, children may live for four or five years. It is my judgment that the length of life of the average diabetic child is doubled by the Allen treatment.

Young adults do somewhat better than children. In many cases the tolerance for food slowly declines in spite of the most rigid restrictions; others do fairly well; but I have seen very few cases which justify the hope that anything approaching a normal tenure or life or physical well-being will ever be attained by this unaided treatment.

Older adults, as would be expected, do correspondingly better. A large proportion of my living cases are in good health and many of them undoubtedly will live out a normal expectancy.

My conclusions from this study are as follows:

1. Statistics as to the prevalence of diabetes, cures obtained and other data, based on former and inaccurate and incomplete methods of study, are untrustworthy. It is quite impossible therefore to compare with fairness results obtained by the use of the Allen method and results obtained by methods formerly in use.

2. In spite of these difficulties an extended clinical experience covering the use of all known forms of diabetic treatment justifies the conclusion that the Allen treatment is a distinct clinical advance. While permanent cures are not attained, nevertheless patients for a considerable time are much benefited.

3. It is difficult to say how much is added to the expectancy of life of the diabetic by this treatment. In young people in whom the disease is most serious it would appear that it is at least doubled. Middle-aged and elderly diabetics who are not too seriously afflicted with complications and when faithful to the treatment can probably survive the life-expectancy of the average normal individual.

4. The Allen method is of the greatest service when instituted early in the disease. Like tuberculosis and cancer, diabetes should be recognized and thoroughly treated in its incipiency. Most of the failures in its use are due either to serious complicating disease, or more frequently to unfaithfulness on the part of the patient. In the majority of cases its value is in inverse proportion to the seriousness of the failure of metabolism.

TABLE 1.—TOTAL NUMBER OF CASES OF DIABETES TREATED BY ALLEN METHOD—304.

	Cases.	Per cent.
Total:		
Adults	266	87.5
Children	38	12.5
Living	201	66.0
Adults	186	61.0
Children	15	5.0
Dead	103	34.0
Adults	80	26.0
Children	23	8.0

COMMENT. The foregoing represents only cases studied in the metabolic ward and does not include cases seen in consultation or in office practice.

TABLE 2.—SHOWING SEVERITY OF DISEASE AT BEGINNING OF TREATMENT IN 103 CASES OF DIABETES OF ALL AGES WHICH HAVE ENDED FATALLY.

Cases.	Per cent.	Severity.
11	10.5	Mild.
19	18.5	Moderately severe.
73	71.0	Severe.

COMMENT. The greatest hope and safety for the victim of diabetes depends upon the early recognition of the disease and its intelligent and faithful treatment. In this respect it resembles tuberculosis.

TABLE 3.—SHOWING SEVERITY OF DISEASE AT BEGINNING OF TREATMENT IN 80 CASES OF DIABETES IN ADULTS WHICH HAVE ENDED FATALLY

Cases.	Per cent.	Severity.
11	13.5	Mild.
19	24.0	Moderately severe.
50	62.5	Severe.

COMMENT. In this series of fatal cases in adults more than 80 per cent. were seriously ill before treatment was undertaken.

TABLE 4.—SHOWING SEVERITY OF DISEASE AT BEGINNING OF TREATMENT IN 23 CASES OF DIABETES IN CHILDREN WHICH HAVE ENDED FATALLY.

Cases.	Per cent.	Severity.
23	100	Severe.

COMMENT. Diabetes in a child rapidly becomes serious, often it is in an advanced stage before a physician is consulted.

TABLE 5.—IMMEDIATE AND CONTRIBUTING CAUSES OF DEATH IN 103 CASES OF DIABETES OF ALL AGES.

Cases.	Diseases.
71	Diabetes, no evident serious complication.
4	Pneumonia, lobar.
2	Influenza.
2	Tuberculosis, pulmonary.
1	Whooping-cough.
11	Cardiovascular renal.
5	Gangrene
3	Miscellaneous surgical diseases.
2	Cancer.
1	Syphilis.
1	General sepsis.

COMMENT. The foregoing table means that in 71 cases of fatal diabetes there were no serious complications while 32 cases were seriously afflicted with some other disease.

TABLE 6.—IMMEDIATE CAUSE OF DEATH IN 11 CASES OF DIABETES WHICH WERE MILD AT BEGINNING OF ALLEN TREATMENT.

Cases.	Disease.
3	Diabetes, treatment abandoned.
1	Gangrene.
1	General arteriosclerosis.
1	Apoplexy.
1	Pneumonia.
1	Heart.
1	Cholecystitis.
2	Surgical disease.

COMMENT. The Allen treatment of diabetes is of little avail when serious infections are present or when the patient is afflicted with the degenerative processes of old age.

TABLE 7.—IMMEDIATE CAUSES OF DEATH IN 19 CASES OF DIABETES WHICH WERE MODERATELY SEVERE AT BEGINNING OF ALLEN TREATMENT.

Cases.	Disease.
3	Diabetes, uncomplicated.
5	Diabetes, treatment abandoned
2	Gangrene.
3	Apoplexy.
2	General arteriosclerosis.
1	Pneumonia.
1	Tuberculosis.
1	Nephritis.
1	Heart.

TABLE 8.—IMMEDIATE CAUSES OF DEATH IN 73 CASES OF DIABETES WHICH WERE SEVERE AT BEGINNING OF ALLEN TREATMENT.

Cases.	Diseases.
14	Diabetes.
46	Diabetes, treatment abandoned.
2	Gangrene.
2	Pneumonia.
2	Influenza.
1	Syphilis.
1	Heart.
1	Sepsis.
1	Tuberculosis.
2	Cancer.
1	Whooping-cough.

COMMENT. The foregoing table shows that many cases find the Allen treatment too exacting and rigorous. A very considerable proportion of those who die from pure diabetes are severe cases who wilfully violate their diets and then rapidly succumb to the malady.

TABLE 9.—SHOWING FAITHFULNESS TO ALLEN TREATMENT IN 103 CASES OF FATAL DIABETES, ALL AGES.

Cases.	Per cent.	Allen treatment.
22	21.5	Treatment had nothing to do with death.
17	16.5	Treatment abandoned after preliminary observations.
28	27.0	Treatment carried on for a very short period, then abandoned.
22	21.5	Treatment carried on for a longer period, then abandoned.
14	13.5	Treatment faithfully carried on until death.

COMMENT. It will be observed that in the above series comparatively few of the fatal cases, less than 14 per cent., were persistently faithful to the treatment. Many cases unquestionably die because of lack of courage. Cases with serious or hopeless complications frequently abdomen dietary treatment.

TABLE 10.—SHOWING FAITHFULNESS TO ALLEN TREATMENT IN 80 CASES OF FATAL DIABETES IN ADULTS.

Cases.	Per cent.	Allen treatment.
18	22.5	Treatment had nothing to do with death.
14	17.5	Treatment abandoned after preliminary observations.
19	23.8	Treatment carried on for a very short period, then abandoned.
19	23.8	Treatment carried on for a longer period, then abandoned.
10	12.5	Treatment faithfully carried on until death.

COMMENT. In many of the foregoing cases in adults death resulted because of the inability of the patients to provide suitable care. It will be noted that comparatively few were faithful to the treatment.

TABLE 11.—SHOWING FAITHFULNESS TO ALLEN TREATMENT IN 23 CASES OF FATAL DIABETES IN CHILDREN.

Cases.	Per cent.	Allen treatment.
4	17.5	Treatment had nothing to do with death.
3	13.0	Treatment abandoned after preliminary observations.
9	39.0	Treatment carried on for a very short period, then abandoned.
3	13.0	Treatment carried on for a longer period, then abandoned.
4	17.5	Treatment faithfully carried on until death.

COMMENT. Neglected diabetes is more rapidly and certainly fatal in a child than in an adult. Persistent and careful treatment imposes on the parents a task requiring much fortitude and intelligence.

TABLE 12.—SHOWING FAITHFULNESS TO ALLEN TREATMENT IN 201 LIVING CASES OF DIABETES.

Allen treatment.	Cases.	Per cent.
Abandoned after preliminary observations	9	4.5
Carried on for short period, then abandoned	9	4.5
Carried on for a longer period, then abandoned	44	21.5
Faithfully carried on up to present date	128	63.5
Unknown	11	5.0

COMMENT. There is little question but that many failures ascribed to the treatment are due to lack of faithfulness on the part of the patient.

TABLE 13.—SHOWING PRESENT CONDITION OF 89 CASES OF DIABETES TREATED BY THE ALLEN METHOD WHICH WERE MILD AT BEGINNING OF TREATMENT.

Cases.	Per cent.	Present condition.
49	55.0	Good.
6	7.0	Fair.
7	8.0	Poor.
3	3.0	Very poor.
11	12.0	Dead.
13	15.0	Unknown.

COMMENT. The majority of cases who live within their food tolerance gain in physical vigor; furthermore the distressing symptoms incident to the disease noticeably lessen.

TABLE 14.—SHOWING PRESENT CONDITION OF 67 CASES OF DIABETES TREATED BY THE ALLEN METHOD WHICH WERE MODERATELY SEVERE AT BEGINNING OF TREATMENT.

Cases.	Per cent.	Present condition.
33	49.0	Good.
7	10.5	Fair.
4	6.0	Poor.
3	4.5	Very poor.
19	28.5	Dead.
1	1.5	Unknown.

COMMENT. Moderately severe cases do surprisingly well, as evidenced by the foregoing table.

TABLE 15.—SHOWING PRESENT CONDITION OF 148 CASES OF DIABETES TREATED BY THE ALLEN METHOD WHICH WERE SEVERE AT BEGINNING OF TREATMENT.

Cases.	Per cent.	Present condition.
30	20.0	Good.
6	4.0	Fair.
18	12.0	Poor.
7	4.5	Very poor.
73	50.0	Dead.
14	9.5	Unknown.

COMMENT. Severe cases which have not been rigidly dieted are markedly benefited by the institution of the Allen treatment. Cases which have been dieted carefully for long periods do less well.

TABLE 16.—SHOWING TIME WHICH HAS ELAPSED SINCE ALLEN TREATMENT WAS BEGUN IN A SERIES OF 66 LIVING CASES WHICH WERE SEVERE AT BEGINNING OF TREATMENT.

Cases.	Per cent.	Time.
18	27.5	Less than 1 year.
11	16.5	1 to 2 years.
14	25.0	2 to 3 "
5	7.5	3 to 4 "
18	27.5	4 to 5 "

COMMENT. The time element is a most important factor in the evaluation of any treatment. The Allen method has been in use approximately five years, hence eighteen of the foregoing severe cases have been treated by the method since it was first made public. Under ordinary methods of treatment it is probable that few if any of these cases would be alive today.

THE APPLICATION OF OCCUPATIONAL THERAPY IN CIVIL LIFE TO CASES PRESENTING PARALYSIS, CONTRACTURE, FIBROSIS, OR LACK OF COÖRDINATION.

By John H. Arnett, M.D.,
PHILADELPHIA.

Introduction. The men who worked with Dr. Charles H. Frazier on the neurosurgical staffs of our army hospitals in Cape May and Staten Island had the opportunity to observe under favorable conditions over 1200 cases of peripheral nerve injury. We were able to compare the effect of rest and exercise of the injured part; to observe the relative value of active and passive motion; and finally to study the curative value of various types of active movement. Although toward the beginning there were conflicting ideas regarding the best method of treating extremities, paralyzed by peripheral nerve lesions, after observing these cases over months we concluded, practically unanimously, that the men who used their paralyzed limbs did better than those where rest was practised and that those who engaged in good hard work at home on the farm or in the occupational workshop of the hospital did better than those who only received massage and used their injured limbs but little. In consequence of these observations, occupational therapy was developed along certain new lines. Instead of looking upon it as a means of amusing and diverting the patients, a study was made to determine just which muscles and joints were brought into play by each occupation. An attempt was then made to assign each patient to the type of work best adapted to the treatment of his particular disability. In watching these developments we have been impressed with the possibilities for utilizing certain branches of occupational therapy in our civil hospitals in the treatment of peripheral nerve cases. What applies to the treatment of nerve injuries may also be true of many other groups of cases showing one or more of the phenomena which the former present, namely, paralysis, contracture, fibrosis or lack of coördination. This paper will deal with those phases of occupational therapy which were found to be of most value in our army experience and which seem most readily applicable to the treatment of the various forms of disability found in civil life.

The Application of Occupational Therapy. *Conditions under which it is Indicated.* The examiner should first assure himself of the presence of a lesion of such a character that improvement under occupational therapy might be expected. Next, that no condition exists which would contra-indicate the use of the disabled part.

Finally a decision should be reached as to which aspect of the patient's case should receive the first consideration.

Is pain a marked feature? If so, only one type of work is available until this condition improves, this being clay modelling.

Are fibrosis or undesirable contractures present? If so, treatment should next aim to correct these and wood-polishing would be indicated in the average case. It should be borne in mind, however, that some contractures are of benefit. In musculospiral paralysis, for example, treatment should not aim to overcome moderate contractures in the extensors, as this condition is desirable, since it assists in holding up the wrist and makes possible for the patient many compensatory movements.

Does paralysis alone exist? If complete paralysis in certain groups of muscles is present, work should be prescribed which would by the alternate contraction and relaxation of the muscles lying nearest to the paralyzed ones have the mechanical effect of increasing the flow of blood and lymph about the paralyzed muscles. This might be likened to massage of a diseased muscle by its healthy neighbor, and for this action, carpentry is probably of the greatest value.

Is recovery of function commencing? If so the work should aim to produce well-coördinated action in the newly innervated muscles. Typewriting was found to be quite valuable in this respect.

If recovery of function in certain muscle groups is improbable, treatment should be directed toward the development of compensatory movements. The mechanism of these substituted movements has been discussed in a previous paper.[1]

Directions to the Patient. 1. Length and Character of Treatments. The character of the work, the length and time of the working period and the number of such periods during the day should be specifically stated in the directions to the patient. The length of the periods should not exceed five minutes at first. After a few days this can be gradually increased, but should never exceed an hour. The number of working periods prescribed in a day must depend upon the time the patient is willing to give to his work and the time given to other forms of treatment. About one-third of the patient's treatment time should be spent in occupational therapy.

2. Appliances. The patient should be instructed which tools and appliances are to be used and whether or not a splint is to be worn. Generally speaking, such appliances as the wrist-drop and the foot-drop splints, which are used to prevent overstretching, should be worn while working. Splints used to overcome deformity from contractures should be removed just before work is begun and reapplied the instant the work is finished, so that any gain which is made in overcoming the deformity may be held by the splint.

[1] Ingham and Arnett: Arch. Neurol. and Psych., February, 1920.

3. Position of the Patient. The exact position of the patient while at work should be specified. Here the general rule is to immobilize, as far as possible, all parts of the body proximal to the structures which are being treated. For example, in prescribing work to increase the mobility of the radio-ulnar joint the upper arm should be immobilized by grasping it from behind with the other hand. Furthermore, some positions tend to overstretch the paralyzed muscles and should be avoided.

FIG. 1.—Shoulder extension is being measured. Modifications of this simple metrotherapy device may be used for other joints. Each week the reading is graphically charted and furnishes a quantitative record of the degree of motion attained.

4. Cautions. Patients with sensory loss are very liable to the occurrence of traumatic ulcers which are slow to heal and may interfere with all forms of treatment for weeks. In wood-polishing such patients should wear a suitable device to prevent blister formation, and whenever at work they should be under constant supervision.

5. Metrotherapy. Before treatment is begun the degree of both active and passive movement should be measured in one or more of the joints under treatment, and each week this measurement should be repeated. Simple measuring devices which are very satisfactory

can readily be constructed (Fig. 1). A graph showing the curve of recovery should be made, as this is of value in maintaining the patient's interest and showing how well the work is accomplishing its purpose. When the curve ceases to rise it means either that full mobilization has been secured or that this form of treatment is unsuccessful. In either case the therapy should be changed.

Contra-indications to Occupational Therapy. Where an unhealed wound or infection exists, obviously rest is required. Likewise, following nerve suture, ample time must be allowed for the down-growing axis-cylinders to bridge the gap and become firmly implanted in the distal nerve segment, before the part can be used. Finally in patients with sensory lesions, certain occupations, such as tin work are contra-indicated because of the danger of cutting or burning the hands.

Forms of Occupational Therapy. *For Pain.* In painful lesions involving the upper extremity, clay modelling is the occupation *par excellence.* The clay should be kept at about 100° F., and should be of mushy consistency where pain is great. Movements during the very painful stage should be largely passive in nature, the painful hand being immersed in clay and moved by the other hand. Later, clay of harder consistency may be moulded by rolling and twisting movements. Finally monolith beads may be rolled or pottery made. Clay modelling is valuable not only where pain is the chief factor in the case but also where extensive paralysis is present without fibrosis. Here this form of occupational therapy is resorted to simply because the patient is unable to move his fingers sufficiently to do anything else.

For Fibrosis. Where fibrosis or contractures exist without marked pain, oft-repeated movements of the affected joints are indicated.

1. Wrist or Finger-joints Involved. Where the finger- or wrist-joints are deformed, wood-polishing is most satisfactory. Where the deformity is one of flexion the holder shown in Figs. 2 and 3 should be worn upon the palmar surface of the hand. By wearing the same appliance upon the dorsal surface of the hand, deformities of extension may likewise be treated. After a few hours' work upon ordinary wood a beautiful polish will reward the patient while the constant pressure and repeated movements increase the circulation and are of demonstrable benefit in overcoming the average deformity.

2. Radio-ulnar Joint. Where fibrosis exists which interferes with the movements of pronation and supination, work requiring rotation of the radius upon the ulna is indicated. This motion may be secured by the use of the screw-driver, the gimlet, or the awl. It is well to immobilize the upper arm by grasping it from behind, otherwise the humerus will rotate instead of the radius. If the

patient shows a tendency to rotate the entire body, this may be overcome by having him work in the sitting position.

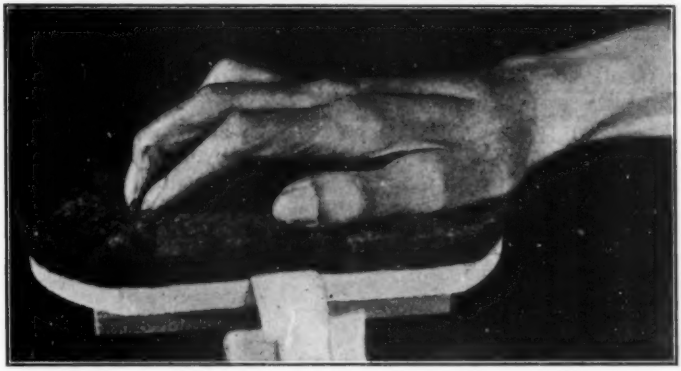

FIG. 2.—Hand with marked contractures due to brachial plexus injury, ready to be fastened into the wood polishing appliance. The thick felt back protects the palm and fingers. The block beneath, holding the sandpaper, can readily be removed, and fresh sandpaper inserted.

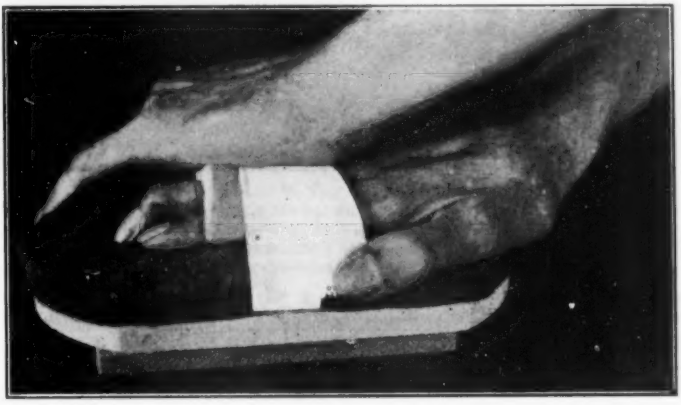

FIG. 3.—The same patient shown engaged in wood polishing. The tight strap over the back of the hand assists in straightening out the deformed fingers, and pressure with the other hand, aided by the to-and-fro motion of polishing, tends to work out the fibrosis and to increase nutrition.

3. Elbow. For limitation of flexion and extension of the elbow, planing and sawing are very satisfactory. Here again the sitting position is best (Fig. 4).

4. Shoulder. For limitation of shoulder movement, wood-chopping or swinging a heavy sledge is valuable. Where the disability prevents this, sweeping movements may be of benefit, and are produced in polishing large surfaces, such as windows or table-tops.

5. Ankle. For fibrosis limiting ankle motion, any apparatus with a treadle like that of the common sewing machine is valuable. Most jig-saws are propelled in this way. To prevent stretching of the anterior tibial muscles, the patient should sit or stand in such a position that the ankle at no time extends beyond 90 degrees. If this cannot be attained by a regulation of the patient's position a thick pad may be inserted beneath the sole as far as the instep. If

FIG. 4.—Sawing is valuable in mobilizing the stiff elbow, and bringing the shoulder muscles into play. The patient, a case of musculospiral paralysis, is shown wearhis wrist-drop splint as he works. The sitting position immobilizes the trunk, so that the work is done entirely with the upper extremity.

there is danger of stretching the muscles supplied by the internal popliteal nerve the heel may be raised by a block and a position assumed which will prevent flexion of the ankle beyond 90 degrees.

6. Knee or Hip. Where fibrosis limits the knee or hip movements a lathe, jig-saw or other machine propelled with pedals, like a bicycle, is valuable. In this case as soon as the knee becomes straighter the seat should be raised higher, so that finally the seat should be so high that the knee must be fully extended to permit the foot to touch the pedal.

For Uncomplicated Paralysis. Here we have the problem of maintaining the nutrition of paralyzed muscles, developing compensatory movements and preventing fibrosis. Carpentry, metal-

work, book-binding, weaving and toy-making have been found particularly useful for accomplishing these objects. Considerable latitude may be exercised in the selection of the occupation, yet the best results will be obtained by choosing work which will call into action such movements as are most like those produced by the paralyzed muscles. Thus compensatory movements will best be developed, the joints most liable to fibrosis will be brought into play and the muscles nearest those which are paralyzed will be exercised.

For Muscles which are Recovering. Finally we are met with the problem of reëducating and recoördinating muscles which are recovering. The best results are here attained by laying stress

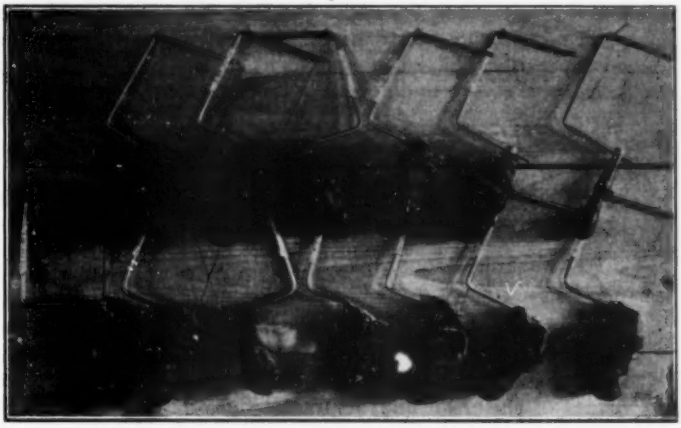

FIG. 5.—Coping saws, used in making toys and puzzles. Each handle is covered with modelling compound containing the impression of a patient's hand. Such saws can be used by patients with deformities and paralyses so severe that they would be unable to hold the ordinary saw.

upon the accuracy of the work done. Musculospiral cases, for instance, who have been doing simple beaten work which requires merely repeated strokes of the hammer upon metal may be given fine beaten work or they may use the carpenter's mallet and chisel.

For pronation and supination, engraving and certain types of wood-carving are valuable.

For flexion and extension of the elbow the coping saw may be substituted for the carpenter's saw and thin material cut into the shape of toys or puzzles (Fig. 5).

For intrinsic hand muscles, type-setting, type-writing, beadwork knitting and penmanship are very valuable.

Conclusions. The advantage which occupational therapy possesses over other forms of mechanical treatment lies in the fact

that interesting work secures repetition of movements without undue fatigue. Not only must the physician take into consideration, therefore, the type of movements produced by the work which he is about to prescribe, but also the desires and interests of the patient.

We found that the soldiers in the hospital took kindly to occupational therapy, and often in spite of their disabilities produced work which from an artistic and technical point of view was of a high order. From a study of these cases over a period of more than a year it became evident that the results of this form of treatment entitle it to an important place among the therapeutic agents at our disposal in the treatment of injuries presenting paralysis, contracture, fibrosis or lack of coördination. In view of the fact that occupational therapy has been proved to be of definite value in the treatment of various other conditions, possibly the day is not far distant when an occupational therapy department, under a trained supervisor, will be recognized as a necessary part of the equipment of every up-to-date hospital.

SOME OBSERVATIONS ON THE USE OF ARSPHENAMIN: ITS EFFECT ON THE KIDNEYS AND ITS THERAPEUTIC RESULTS.

By Horace B. Anderson, M.D.,
PENNSYLVANIA HOSPITAL, PHILADELPHIA.

Recent medical literature is pregnant with articles either extolling the virtues of salvarsan and arsphenamin by reporting series of cases in which observations on the clinical manifestations and serologic reactions have indicated the therapeutic value of the drug or abusing and condemning the use of it by reporting all manner of reactions varying from the mild vasomotor disturbances to fatalities. It is the purpose of this paper to do neither the one thing nor the other, but rather to take the opposite ground; to submit some evidence, after studying 39 cases which have had twenty or more doses of arsphenamin, to show the non-toxic effect of the drug on the kidneys when administered in therapeutic doses over a comparatively long period of time and at the same time to give some data concerning its value as a therapeutic agent.

Concerning the gross and histopathologic changes of acute arsphenamin poisoning we have already acquired considerable information from the studies and reports of Kolmer[1] and others, but concerning the chronic poisoning we have less information largely because of the comparatively recent use of the drug. In the future, no doubt,

[1] Am. Jour. Med. Sc., 1920, clx, 188.

we will have a more accurate knowledge of the pathologic effects of its prolonged use and can come more nearly answering the important question, "What changes are produced in the kidneys by the prolonged use of arsphenamin?" One only appreciates the importance of such a question when he reflects on the fact that thousands of doses of arsphenamin are being administered every day to patients throughout the country and by the energetic application of their plans to eradicate syphilis the U. S. P. H. Service and the State boards of health are increasing daily the number of patients treated.

In this clinic prior to 1918 it was the policy to give weekly injections continuously as long as the patients would submit to it and the Wassermann reaction was positive. Since that date the policy has been to administer a course of arsphenamin consisting of six weekly injections, the dose being, unless contra-indicated, 1 decigram per thirty pounds body weight followed by a ten weeks' course of mercury in the form of the inunctions, the protoiodides or injections of the salicylate of mercury and after this a rest of one month without treatment. During the second and third year the same plan of treatment is used, but the duration of the course is modified somewhat to meet the clinical aspect of the case, the serologic findings and the mental attitude of the patient.

Wassermann tests are taken every second week while arsphenamin is being given and at the end of each course of mercury. Acetone insoluble and alcoholic extract reinforced by cholesterin antigens are used in all tests.

It was possible to study the kidney function of 39 patients who had had over twenty doses of arsphenamin. The phenolsulphonephthalein tests were performed after the method of Rowntree and Geraghty,[2] the urea nitrogen, non-protein nitrogen and creatinin after the method of Folin and Wu[3] and those cases that showed albumin in the urine by the heat and nitric acid tests were further tested for globulin by the use of ammonium sulphate, etc., as described by Hawk.[4] The data of kidney function tests is given in Table I.

The average number of treatments for these 39 cases is approximately 30 doses, consisting of 4.6 decigrams each distributed over a period of a little over two years. To state it another way these patients have had an average of 14 treatments of arsphenamin per year for about twenty-six months. The preparations used have varied but in the main consisted of arsenobenzol, "Billion" arsphenamin, Metz and all later treatments have been of arsphenamin made by the Dermatological Research Laboratory of Philadelphia.

[2] Jour. Pharm. and Exper. Therap., 1910, i, 579.
[3] Jour. Biol. Chem., 1919, xxxviii, 81.
[4] Pract. Phys. Chem., 1918, 6 ed., p. 454.

TABLE I.

Case No.	History No.	No. of doses.	No. of gms.	Duration treatment.		Present phenol-phthalein output.		Qualitative urine exam. after last treatment.				Present blood examination.		
				Year.	Months.	First hour.	Second hour.	Specific gravity.	Albumin.	Casts.	Sugar.	Non-protein N.	Urea N.	Creatinin.
1	245	32	12.0	1	7	50	18	1020	0	0	0	33	12	1.6
2	254	24	17.5	1	4	60	13	1020	0	0	0	32	15	1.8
3	281	50	20.8	4	9	55	18	1018	0	0	0	27	17	2.2
4	566	27	13.0	6	2	60	23	1020	0	0	0	33	12	1.7
5	660	52	20.0	1	7	55	18	1020	0	0	0	30	13	2.2
6	634	42	15.4	3	2	55	18	1012	Faint tr.	0	0	28	13	1.6
7	647	29	13.8	4	5	30	15	1015	0	0	0	46	14	2.0
8	432	26	12.9	..	9	70	15	1025	0	0	0	34	17.5	2.4
9	419	28	14.2	1	6	55	Lost	1020	0	0	0	33	16	2.0
10	370	38	15.0	2	11	65	13	1023	0	0	0	25	10	1.5
11	667	35	11.7	1	8	25	20	1025	0	0	0	31	17	1.8
12	810	44	20.0	3	9	50	20	1025	0	0	0	34	15	1.5
13	68	38	13.0	5	3	65	12	1010	0	0	0	28	12	2.3
14	431	36	15.6	3	6	60	13	1021	0	0	0	37	17	2.0
15	360	25	8.0	2	2	60	18	1025	0	0	0	32	12	1.7
16	444	20	7.7	2	5	60	13	1005	0	0	0	34	13	2.2
17	33	39	21.0	2	6	60	23	1012	0	0	0	30	14	2.8
18	37	21	12.0	1	2	60	15	1025	0	0	0	28	20	1.9
19	63	25	7.25	1	5	30	20	1004	0	0	0	27	14	1.7
20	64	32	13.4	4	2	50	10	1010	0	0	0	28	12	2.3
21	109	25	10.0	1	11	60	15	1015	Tr., none 2d exam.	0	0	31	20	2.0
22	158	45	20.0	4	5	50	20	1025	0	0	0	32	12	1.6
23	215	35	15.7	2	11	70	10	1015	0	0	0	35	13	2.0
24	220	22	9.35	..	11	55	20	1025	Very faint tr., none 2d exam.	0	0	37	20	1.3
25	123	33	13.2	1	9	25	15	1018	Dis. tr.; no glob.	Lt. gr.	0	37	17	1.6
26	758	34	15.6	2	..	60	15	1024	0	0	0	33	12	1.6
27	582	31	12.8	1	8	60	10	1021	0	0	0	35	17	1.5
28	295	21	11.5	1	..	55	15	1020	0	0	0	35	17	1.7
29	595	22	11.0	2	4	30	15	1012	Cloudy, alb. and glob.	0	0	29	14	1.6
30	585	32	15.1	1	6	30	15	1015	0	0	0	29	14	1.7
31	246	34	15.5	1	11	60	15	1025	0	0	0	31	13	1.7
32	275	20	7.9	2	1	60	10	1015	0	0	0	42	15	1.6
33	232	20	9.9	1	4	60	15	1020	0	0	0	46	20	1.6
34	166	28	13.8	1	11	55	20	1024	0	0	0	40	18	1.7
35	18	23	11.5	1	..	55	10	1024	0	0	0	34	17	1.7
36	597	26	12.1	2	2	65	20	1020	0	0	0	29	13	1.7
37	656	20	10.0	1	1	55	15	1018	0	0	0	33	14	1.6
38	217	21	10.4	2	1	60	15	1010	0	0	0	37	16	1.6
39	258	29	13.4	1	3	65	10	1020	0	0	0	33	13	1.8

A table giving the arsphenamin received, the duration of treatment, the phenolsulphonephthalein output of the kidneys and the urine and blood examination of patients having had twenty or more doses of arsphenamin.

With the exception of patient No. 25, who was transferred from the medical clinic, where he was first seen and diagnosticated tabes and nephritis, there is no conclusive p oof of an existing nephritis in any of these cases. At that time and at all subsequent examinations the urine of patient No. 25 showed some casts and albumin.

His condition apparently is no worse now than when treatment was first instituted. Judging from the phenolsulphonephthalein output and he albumin and casts in the urine this patient has some nephropathy, but the evidence is in favor of its having been acquired prior to treatment. Patients Nos. 6, 21, 24 respectively show a trace of albumin at one examination, but there is no other evidence of a nephritis. Patient No. 29 shows a cloud of albumin, but when appropriate tests were used it was discerned that more than 50 per cent. of the protein precipitate was globulin. This case is well clinically, shows no other evidence of nephritis in the other examinations and therefore might be a case of non-nephritic proteinuria.

The data of table No. 1 lead in general to the conclusion that no demonstrable kidney damage has been done. There is, of course, nothing to show whether or not there has been any limitation of the wide factor of safety which the kidney naturally possesses. Several of the patients show a decreased phthalein output which one may interpret as one will.

The efficiency of any new system of treatment must be determined ultimately by the Wassermann reaction, for it has long been known that negative clinical manifestations are no guide to the patient's potential syphilitic state.

The technic employed in our laboratory for doing Wassermann tests has been modeled after that described by H. K. Detweiler.[5] We use, however, only 0.1 c.c. of patient's serum and use the water-bath instead of dry heat for incubation. Detweiler's method of daily titrations of the complement as well as the amboceptor has proved very satisfactory. The antisheep hemolytic system is employed.

Two antigens are used, the acetone insoluble and the cholesterin reinforced alcoholic extract, made after the method described by Kolmer.[6] These antigens are titrated every six weeks for their antigenetic and anticomplementary values. The former is tested on the pooled sera of patients who both clinically and serologically are luetic.

In our experience with cholesterized antigen it is the more sensitive and the last to become negative. The acetone insoluble is far more liable to be a correct index to the true condition when positive, but often fails to give a positive reaction in the early and late stages and also after a limited amount of treatment. This fact is demonstrated in Tables III, IV and V. Although it is true that a cholesterinized antigen will not infrequently give a false positive reaction, we believe it is the most valuable antigen that can be employed as a guide to treatment.

[5] Am. Jour. Syph., 1918, ii, 120–137.
[6] Inf. Immunity and Spec. Ther., 1917, 2d ed., p. 446.

TABLE II.

Case No.	Age.	Chief lesion on admission.	Duration of disease.		Stage.	No. of doses.	Courses of mercury.		Wassermann on admission.	No. of doses before first persistent neg. Wass.	Present condition.		No. of consecutive neg. Wass.	Time since first neg. Wass., months	Total arsphenamin, decigrams.	Duration of treatment, weeks.
			Yrs.	Mos.			Ung.	Protoid.			Clinically.	Serologically.				
1	45	To be cured	9	..	Third	32	3	4	St. pos.	21	Well	Negative	3	4	124	82
2	36	To be cured	..	4	Latent	24	4	..	St. pos.	9	Well	Negative	8	16	175	68
*3	45	Dizzy spells; negative Wass.; spinal fluid	10	..	Third	50	..	3	St. pos.	Wass. pos.	Very much improved	Wk. pos.	..	..	208	247
4	37	Maxillary sinusitis	12–13	..	Third	27	..	1	Positive	26	Well	Negative	3	3	130	319
*5	35	To be cured	3	..	Latent	52	11	1	St. pos.	43	Well	Negative	4	16	222	84
*6	39	Gumma of throat	?	..	Third	42	1	4	St. pos.	Wass. pos.	Well	Wk. pos.	0	..	154	166
*7	40	Ozena	3–4	..	Third	29	3	2	Positive	20	Well	Negative	4	8	138	228
8	32	General adenitis	5	..	Late second	26	1	8	Positive	Wass. pos.	Well; small glands	Positive	0	..	129	41
9	32	General weakness	?	..	Second	28	3	3	Wk. pos.	7	Well	Negative	3	2	142	80
*10	27	Cervical adenitis	..	2	Second	38	1	2	St. pos.	34	Well; small glands	Negative	3	10	154	156
11	50	Abdominal aneurysm	23	..	Third	35	2	4	St. pos.	Wass. pos.	No change	Wk. pos.	0	..	117	87
*12	32	Keratitis rash	..	3	Second	44	10	..	St. pos.	4	Well	Negative	4	2	200	196
13	13	None	Congenital		Congenital	38	Continuous inunctions		St. pos.	23	Well	Negative	2	10	130	273
*14	50	Headache; dizziness	10	..	Third	36	4	..	Positive	29	Well	Negative	3	14	156	180
*15	26	Chancre	..	2	First	25	2	3	St. pos.	7	Well	Negative	3	28	113	111

16	36	Diabetes insipidus	..	..	Third	20	4	..	St. pos.	19	Strong; improved	Negative	2	12	77	74
*17	37	Ulcer of penis	9	..	Third	39	5	4	St. pos.	35	Well	Negative	2	12	210	75
18	35	Pharyngitis	?	..	Second	21	2	..	St. pos.	Wass. pos.	Well	Wk. pos.	..	..	120	61
19	9	Interstitial keratitis	Congenital		Congenital	25	4	1	St. pos.	Wass. pos.	Well	St. pos.	..	..	72	74
20	43	Optic atrophy	?	..	Third	32	5	1	St. pos.	20	Improved	Negative	6	12	134	215
21	42	Leg ulcers	?	..	Third	25	3	2	St. pos.	Wass. pos.	Well ?	Wk. pos.	..	..	85	102
22	32	Mucous patches in mouth	14	..	Third	45	1	1	St. pos.	15	Well	Negative	12	24	207	228
23	34	Pain in heels	12	..	?	35	4	..	St. pos.	Wass. pos.	Well	Wk. pos.	..	..	157	154
24	30	?	?	..	?	22	..	1	St. pos.	16	Well	Negative	7	3	93	48
25	44	Tabes	?	..	Third	33	2	7	Neg. +++ after first treatment	9	Very much improved	Negative; blood and spinal fluid	5	6	132	192
26	37	Luetic sore-throat	1	..	Second	34	1	4	St. pos.	21	Well	Negative	5	12	156	106
*27	..	Headache; weakness	4	..	Third	31	1	..	St. pos.	30	Well	Negative	1	18	128	87
*28	32	Chancre	..	2	Late primary	21	..	4	Wk. pos.	17	Well	Negative	2	14	115	54
29	33	Leg ulcers	9	..	Third	22	1	3	Wk. pos.	17	Well	Negative	5	12	110	120
30	40	Myocarditis	?	..	Third	32	3	4	Positive	14	Well	Negative	4	30	151	177
31	26	Myocarditis; aortitis	?	..	?	34	2	..	Positive	Wass. pos.	Somewhat improved	Positive	..	..	155	98
32	30	Rash	1	..	Second	20	3	..	St. pos.	12	Well	Negative	5	12	79	105
33	38	To be cured	..	4	Late primary	20	3	..	St. pos.	Wass. pos.	Well	Wk. pos.	..	..	99	70
34	34	Ozena	?	..	Third	28	3	..	St. pos.	13	Well	Negative	9	14	138	98
35	33	Rash; mucous patch	..	2	Second	23	1	2	St. pos.	7	Well	Negative	8	12	115	53
36	31	Chancre	..	1	Primary	26	5	3	St. pos.	Wass. pos.	Well	Wk. pos.	..	..	121	108
37	35	Body pains	?	..	Second	20	1	2	Positive	18	Well	Negative	1	2	100	155
38	27	To be cured	?	..	Latent	21	3	..	St. pos.	7	Well	Positive	..	..	104	105
39	37	Macular eruption	..	2	Second	29	..	..	St. pos.	11	Well	Negative	8	12	134	65

A table giving a summary of the history, treatment and present condition of the patients of Table I.

TABLE III.—IN THESE TEN CASES THE CHOLESTERINIZED ANTIGEN IS APPARENTLY MORE SENSITIVE THAN THE ACETONE INSOLUBLE ANTIGEN.

Case No.	1		2		3		4		5		6		7		8		9		10	
History No.	899		P.P.		960		1059		1063		1086		1043		986		1067		1049	
Lesion	Chancre.		Chancre.		Chancre.		Early second-aries.		Chancre.		Chancre.		Early second-aries.		Chancre.		Chancre.		Erup. macular.	
Weekly injec. arsphenamin	Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.	
	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.
1	2	1	2	—	1	—	4	—	4	3	4	1	4	2	4	—	3	—	3	—
2																				
3	—	—	1	—	—	—	4	4	4	3	1	—	4	1	—	—	1	—	4	2
4	4	—	..	..	..	..	1	—	..	..	..	..	..	..	2	—				
5	..	..	—	—	—	—	2	—	3	3	..	..	—	—	..	..	1	—	1	1
6	1	—	..	..	..	..	..	..	..	..	..	..	..	..	—	—				
									Two months of mercury											
15																				
16	—	—	—	—	..	..	..	..	—	—	..	..	..	..	..	..	..	..	—	—
17	—	—																		
18																				

TABLE IV.—IN LATE STAGES OF SYPHILIS THE CHOLESTERINIZED ANTIGEN SEEMS TO BE MORE SENSITIVE IN SOME CASES.

Case No.	1		2		3		4		5		6		7		8		9		10	
History No.	1021		1048		1019		1027		966		963		1078		951		976		1	
Lesion	Latent.		Body pains.		Ulcer.		Vascu-lar.		Latent.		Latent.		Ulcer.		Body pains.		Ulcer.		Latent.	
Weekly injec. arsphenamin	Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.	
	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A
1	3	—	4	—	4	—	3	—	4	2	4	—	4	—	4	—	4	3	4	1
2																				
3	1	—	3	1	1	1	2	1	3	—	4	1	4	1	4	—	4	3	4	2
4																				
5	3	1	..	..	..	..	4	—	1	—	2	2	2	—	4	—	4	1	4	—
6	..	..	3	1	4	1														
									Two months mercury											
15	2	1	..	..	4	1	..	..	..	..	1	—	1	—	—	—	2	—	3	—
16	..	..	..	..	..	..	..	..	—	—	3	—	..	..	..	..	4	1		
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	—	—
18	..	..	..	..	..	..	..	..	—	—										
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	—	—
20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	—	—

Tables giving the Wassermann reactions with acetone insoluble antigen (A) and cholesterinized alcoholic extract antigen (C). The figures 1 to 4 mean Wassermann 1 to 4 plus, — implies a negative Wassermann. The specimens of blood were taken at the time of the weekly injection of arsphenamin.

TABLE V.—UNDER TREATMENT THE CHOLESTERINIZED ANTIGEN OFTEN REMAINS POSITIVE AFTER THE ACETONE INSOLUBLE ANTIGEN HAS BECOME NEGATIVE.

Case No.	1		2		3		4		5		6		7		8		9		10	
History No.	886		222		891		8		102		880		427		442		567		976	
Lesion	Chancre.		Second-aries.		Spondy-litis.		Second-aries.		Mucous patches.		Gumma of sternum.		Rash.		Aneu-rysm.		Mucous patches.		Ulcer of septum.	
Weekly injec. arsphenamin	Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.		Wass.	
	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.	C.	A.
1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2																				
3	4	4	4	4	4	4	4	4	..	..	4	3	4	4	4	4	4	4	4	3
4	4	4	4	3	..	..	..	..	4	4										
5	..	..	2	0	4	1	4	—	..	..	4	4	4	2	4	4	..	..	4	1
6	3	1	..	..	..	..	3	—	..	..	4	1	2	—	4	2	..	..	2	1
								Two months of mercury												
15	1	—	..	..	..	..	..	..	2	—	..	..	..	..	..	..	4	—		
16	—	—	..	..	4	1	—	—	4	—	..	..	4	1	2	3				
17	..	..	..	..	..	..	..	..	..	..	3	—	..	..	..	..	4	—		
18	—	—	..	..	3	1	..	..	4	—	..	..	—	—	4	4				
19	..	..	..	..	..	..	..	..	..	..	—	—	..	..	..	..	1	—	4	—
20	..	..	..	..	4	1	..	..	..	..	..	..	4	2	4	—	—	—		
								Two months of mercury												
29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	—				
30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	—	—		
31	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	—				
32																				
33	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	—	—	—		

Tables giving the Wassermann reactions with acetone insoluble antigen (A) and cholesterinized alcoholic extract antigen (C). The figures 1 to 4 mean Wassermann 1 to 4 plus, — implies a negative Wassermann. The specimens of blood were taken at the time of the weekly injection of arsphenamin.

When we make a study of Table II we find 17 of the 39 cases have now had a negative Wassermann reaction for a year or more. Nine of the group have had a negative reaction for less than one year and 13 of the 39 cases continue to have weakly positive and strongly positive reactions. Of those with persistently negative reactions for a year or more 2 were in the primary stage, 4 were in the secondary and 11 in the tertiary and latent stages. The average number of doses to produce persistently negative Wassermann reactions in this group was 18.7, for those in the primary stage 12, for those in the secondary stage 12.7 and in the tertiary and latent stages 21.3 doses.

For the 39 patients the average salvarsan per patient has been 136 decigrams and the average time of treatment one hundred and seventeen weeks. This treatment has resulted in making 17 out of the 39, or 43 per cent. of the patients clinically and serologically negative for a year or more. Seven more patients, 18 per cent., have had more than two persistently negative Wassermanns, so

that, on the whole, more than half of these 39 patients already have a very favorable outlook as far as the ultimate outcome of their treatment is concerned. This 61 per cent. of the patients has had an average of 4.9 courses of six weeks of mercury in some form or other.

TABLE VI.—SECONDARY STAGE.

Case No.	History No.	Number of positive Wassermanns	Decigrams arsphenamin to first persistent negative Wassermann.	Weeks to first persistent negative Wassermann.	Total arsphenamin.	Total weeks.	Number of persistent negative Wassermanns
1	1	1	53	29	68	52	3
2	172	2	40	20	80	44	4
3	315	2	45	18	61	21	2
4	247	2	49	32	73	79	5
5	257	2	35	19	92	82	5
6	324	3	38	28	48	56	3
7	920	4	30	18	70	28	4
8	399	3	51	20	78	24	2
9	914	3	20	4	56	39	4
10	412	4	67	56	67	56	6
11	567	4	55	30	90	52	3
12	843	3	45	5	60	36	6
13	635	2	50	32	60	38	1
14	855	5	57	30	65	44	3
15	685	2	47	52	47	52	1
16	738	2	142	44	142	44	1
17	879	4	65	39	85	42	2

A table giving the arsphenamin and Wassermann records of patients starting treatment in the secondary stage. The time under observation for these patients is short and their ultimate status is still uncertain.

TABLE VII.—TERTIARY STAGE.

Case No.	History No.	Number of positive Wassermanns	Decigrams arsphenamin to first persistent negative Wassermann.	Weeks to first persistent negative Wassermann.	Total arsphenamin.	Total weeks.	Number of persistent negative Wassermanns
1	4	4	95	237	95	237	1
2	183	1	57	102	57	102	1
3	290	2	60	40	90	48	3
4	260	3	96	116	96	178	2
5	880	4	40	20	45	20	1
6	416	4	34	48	59	80	2
7	452	4	72	72	96	92	3
8	553	1	77	48	109	76	5
9	867	4	40	34	94	42	5
10	713	3	59	34	69	45	1
11	807	2	55	34	65	38	2

A table giving the arsphenamin and Wassermann records of patients starting treatment in the tertiary stage. These patients are to be classed with those of Table VI in respect to observation time.

In Tables 6 and 7, which are composed of cases now negative that presented secondary and tertiary lesions on admission, and in the majority of cases more than one positive Wassermann reaction, I believe we get a fair index as to the efficiency or inefficiency, as you may choose to call it, of our present method of treatment. The average amount of treatment necessary to produce the first persisting negative Wassermann reaction in the group of secondary

cases was 52 decigrams and the average time twenty-eight weeks. That is to say, they received 10.2 doses of arsphenamin consisting of 5 decigrams each. The average case, therefore, in this group did not give a persisting negative reaction until near the end of the second course of treatment.

It took an average of 62 decigrams to produce a persisting negative Wassermann reaction in the tertiary group. The time averaged seventy-two weeks. This means that it was during the third course of arsphenamin that they began to show a negative reaction. This at first seems better than the situation with the patients of Table II, but it is to be understood that for the patients of these latter tables more relapses may be expected. We frequently see patients who having received six to twelve doses of arsphenamin have been discharged with a negative Wassermann only to return within about a year both clinically and serologically positive.

Summary. 1. Because of its extensive use at present it is highly important that we know more perfectly the effects of the prolonged use of arsphenamin on the kidneys.

2. Kidney functional tests on 39 cases after they have received thirty do es of arsphenamin, each dose consisting of 4.6 decigrams, and distributed over a two-year period, fail to give any conclusive evidence of injury to the k'dneys.

3. The efficiency of any method of treatment must ultimately be determined by the Wassermann reaction. It is more trustworthy to use at least two antigens; the acetone insoluble antigen is a safe guide to diagnosis and the alcoholic extract reinforced by cholesterin is an excellent guide to treatment.

4. It is impossible to say how much arsphenamin and how many courses of mercury may be necessary to produce a negative Wassermann reaction in any given case.

5. Six injections of arsphenamin and one course of mercury, the amount too often prescribed by certain groups of physicians, may produce one negative Wassermann reaction, but the average case of secondary or tertiary syphilis will require twelve or more doses of arsphenamin and a corresponding amount of treatment with mercury to produce a negative Wassermann reaction, and one which only with further treatment may reasonably be expected to persist.

THE TREATMENT OF TUBERCULOUS ADENITIS BY ROENTGEN RAYS AND RADIUM.[1]

By Russell H. Boggs, M.D.,

ROENTGENOLOGIST, ALLEGHENY GENERAL HOSPITAL; DERMATOLOGIST AND ROENTGENOLOGIST, COLUMBIA AND PITTSBURGH HOSPITAL, PITTSBURGH, PA.

Formerly radiotherapy was used in the treatment of tuberculous adenitis to avoid deformity and unsightly scars; today this treatment is advised because more permanent cures are obtained than by any other method. At present surgeons of experience are not operating primarily for tuberculous adenitis. If they operate it is only to remove fibrous nodes after the tuberculous foci have been destroyed by roentgen rays or radium. Then a dissection of the cervical glands is always contra-indicated. Radiotherapy alone will cure over 90 per cent. of the cases.

Experience has proved that tuberculous adenitis is not primarily a surgical disease. The reason that it took years to prove that cervical adenitis was better treated by radiotherapy was really our fault in being too slow in reporting the cases, and a surgeon would see only a few cases, in the most of which the treatment was inefficient and incomplete. As before stated, in only a small percentage of cases, 5 to 10 per cent., is it advisable to remove fibrous nodules after radiation. If such nodules are removed and examined, little or no tuberculous material would be found, the fibrous stroma of the glands remaining.

In the treatment of tuberculous adenitis the first and most important consideration is that it is a local manifestation of a constitutional disease.

Most of the laryngologists are referring tuberculous adenitis for radiation as a routine procedure, and many will not remove diseased tonsils if the cervical glands are enlarged until the glands have been given a thorough course of treatment, either by roentgen rays or radium. Radiation of the enlarged cervical glands is important before removing the tonsils of children under fifteen years of age, and particularly so if under the age of five or six, as the lymphatic vessels are wide open, and in the removal of the tonsils before radiation there is danger of producing a general infection if tuberculosis is present.

In the past the treatment of tuberculous glands depended largely upon the physician first consulted. The treatment given has been the hygienic, medical, roentgen ray and radium and light therapy, vaccine and surgical. Tuberculin has given unsatisfactory results, and since radiation produces a systemic effect similar to successful

[1] Read before the Westmoreland County Medical Society, Greensburg, Pa., November 9, 1920.

tuberculin treatment and the results are more dependable, vaccines are seldom ever indicated, or at least not until we are able to obtain a more stable vaccine. The local application of iodin, ichthyol and other drugs is useless. Prophylactic treatment is important and should receive more attention. Until recently very little attention was paid to the source of infection. An effort should always be made to find the channels of infection, although it is often difficult to find the primary focus. The importance of removing unhealthy tonsils, bad teeth, etc., should not be overlooked.

The surgical treatment has not comprised any single method. Some would drain abscesses; others would inject antiseptics; others would excise the enlarged glands unless suppuration had occurred; others would do a complete dissection of the superficial glands. Some have hesitated to operate until Nature had partially walled off a sinus, while others disregarded that entirely. As a rule, nothing was done until suppuration had taken place.

Injudicious surgery has been very detrimental. Inefficient surgical treatment is followed by recurrence in the adjacent glands so frequently that when there is an operation performed it is looked upon as the beginning of a series of operations. The contraindications of treatment by surgery are: (1) Children get well without it; (2) we have no certain method of diagnosis in early cases; (3) all the affected glands cannot be removed; (4) scars; (5) recurrences. Since the disease can be removed more successfully by roentgen rays or radium, with no danger of spreading the disease without scarring and without sacrificing tissue, complete extirpation of the tuberculous glands should never be performed until the disease is well localized. Past experience and present results should make everyone advise radiotherapy, for at least the localized effect.

In many clinics more than a thousand cases have been treated by radiotherapy, and operation was required in less than 10 per cent. of the cases, even for the removal of fibrous nodules. Over 90 per cent. were cured by radiation alone.

Different authorities call attention to the fact that when the older methods are employed a certain percentage of the patients acquire pulmonary tuberculosis. This possibility never occurs when radiation is given before any lung involvement takes place. For this reason the medical treatment should not be persisted in too long without radiotherapy.

Large glands due to an inflammatory process are frequently secondary to a septic condition elsewhere and a search should be made for the primary lesion. When this is found and treated, if the glands remain large, and particularly if they show a tendency to suppurate, radiotherapy should be employed at once. If they are given treatment promptly and properly, suppuration can nearly always be avoided. I do not favor opening a tuberculous mass as soon as it begins to soften, as many advocate. Radiation given first

greatly facilitates repair of the parts and the sinus which frequently follows will not be so deep and will heal more readily. Certainly nothing is slower to heal than a sinus leading into a gland which has been opened just as suppuration was beginning. There is no better treatment than radiotherapy for carbuncles, boils or any other of the localized pus infections. Then why be in such haste to open a tuberculous abscess before it begins to bulge? Radiation of abscesses is never painful. This brings up the question—Do the rays produce an immunity both to tuberculosis and mixed infections?

I am sure that the susceptibility to the development of tuberculosis is always greatly lessened after a few radiations, and that the patient, at least in some cases, is rendered immune.

Recent investigations regarding tuberculosis and the various processes of tuberculous infection lead to the conclusion that tuberculosis has three stages: (1) The infection of the glands, usually coming in childhood; (2) the infection of the bones and joints; (3) the infection of the lungs.

There is no longer any doubt that the lymphatic glands form the first line of defence against tuberculosis. Nowhere is this so well demonstrated as when the glands of the neck are invaded, because almost invariably the virulence of the bacillus is greatly lessened after its entrance into the glands. In many cases the disease does not become general, so that many patients recover in a way that shows truly this infection is arrested. These tumors may spontaneously subside without suppuration, while in other patients the disease progresses until fluctuation shows that suppuration has taken place in the glands. Constitutional infection is not uncommon when tuberculous glands are neglected. Therefore a patient with chronic enlarged glands in the neck should have treatment before the constitutional symptoms develop. In the past this did not receive sufficient attention. We see too many cases coming too late where the glands have been enlarging a year or more. Such neglect often necessitates longer treatment and may even endanger the life of the patient.

Untreated tuberculosis of the glands is often followed by tuberculosis of the bones and joints, and finally there is an extension into the glands. In some individuals the process is checked in the bones or the joints. The process becomes very chronic, the resistance of the patient being sufficient to end the infection. Therefore it should be our aim to destroy the disease while it is a primary infection of the glands.

By raying the local infection in the glands its hypersusceptibility is reduced, which prevents the spreading of the disease. Tuberculin has been given for this purpose, but experience has shown that unless we are able to give the proper dosage, with the proper intervals, it may even increase the hypersusceptibility of the patient.

We must remember the responsibility of checking the disease in

the primary stage and treat the glands by radiotherapy as soon as discovered. It should be apparent to everyone that the removal by radical operation is contra-indicated, and when a recurrence takes place, not on account of the lack of surgical skill but because of the presence of the tubercle bacilli which are beyond the reach of the knife, the organism is rendered more susceptible, giving the disease a greater chance to spread than before the operation. The hypersusceptibility to tuberculosis is greatly increased by anything which tends to lower the vitality of the patient.

Tuberculous glands have been classified with regard to the pathologic involvement. Closed glands are found in two varieties, the hyperplastic and the fibrous. In the hyperplastic type the glandular substance increases, together with the stroma. If this variety is left untreated the glands soon liquefy and form an abscess known as soft glands. These may remain a long time, but if left untreated a tryptic ferment will digest the capsules, finally reaching the surface and producing unsightly scars. Fibrous glands occur in those who have a greater resistance, the tuberculous process is slower and the glandular material is not increased in the same ratio as the fibrous tissue. In the fibrous variety Nature is almost curing the patient. If the fibrous tissue does not entirely absorb it will frequently leave a hard nodule, the size of which is determined by the number of glands.

Cicatrized glands are enlarged glands in which the tuberculous process has been healed by the formation of scar tissue. If the glands have attained great size before radiotherapy has been employed a palpable nodule will usually be left. The patient may then think there is still a tuberculous process, and even the physician may not realize that a fibrous healing takes place in the cervical glands the same as it does in the lungs. Particular attention should be directed to this end, and the rays cannot be expected to absorb all the scar tissue which has been formed by the tuberculous process, when the glands have attained great size or when large amounts of fibrous tissue have been formed by Nature's cure before radiotherapy has been employed.

Then when operations are performed for such cicatrized glands radical procedures are never necessary and large, unsightly scars are avoided because the operation is performed for a different purpose. The healed nodules can be removed through a small incision and closed by sutures so that no deformity is left.

Open glands are those that have suppurated and opened to the surface. There are two varieties: those that break down as a result of tryptic ferment, the discharge of which is sterile, and those which break down, due to a mixed infection.

Recurrent glands, after a radical operation consisting mainly of mixed infections, are those recurrent immediately after the operation and those coming on slowly and some time after the operation, which

are usually of a purely tuberculous character. The increased hypersusceptibility of the patient after the operation is often a factor in the recurrence. Glandular enlargements on the opposite side of the neck or in any part of the body shows the increase of susceptibility after a radical operation. In these cases it is important to begin radiotherapy at once and not attempt a second operation, as has been the custom in the past.

It has been known for a long time that contagious diseases increase the hypersusceptibility to a marked degree. We have different grades of susceptibility in tuberculous adenitis. The small closed glands naturally represent the lowest grade of susceptibility, which is explained by the fact that the glands act as filters and contain the tubercle bacilli on their route to other organs.

As long as the glands do not suppurate they are usually checking the tubercle bacilli, although they are undergoing pathologic changes. When the glands have broken down they will not perform their full function as filters and the extension of tuberculosis is more likely. The result obtained by the treatment of tuberculous adenitis with radiotherapy leaves no doubt that this method is the treatment *par excellence* for this condition.

Radiologists are often called upon to treat other glandular enlargements (such as sarcoma, Hodgkin's disease, lymphatic leukemia) and the more rare tumors, such as yaws, glanders and actinomycosis. A few years ago nearly all the glandular enlargements except carcinoma were considered a form of tuberculosis, but at present each has a characteristic picture when studied by the microscope, together with the clinical history. From a clinical standpoint Hodgkin's disease is closely analogous to lymphosarcoma, and in a large majority of cases they resemble each other in the manner in which they react to roentgen rays or radium. Both of these diseases have a malignant tendency to invade adjacent glands and to recur.

It is rather striking how all of these glandular tumors respond to radiotherapy. Either radium or roentgen rays is the best treatment we possess for all these glandular tumors except syphilis, for which we have a specific.

Radiotherapy in its development to date offers a number of problems, a solution of which means a great advancement in the treatment of diseases described as multiple glandular tumors. There is no other treatment which adds so much to the comfort of the patient and prolongs life to the same extent in lymphatic leukemia, Hodgkin's disease and lymphosarcoma.

Conclusions. 1. Radium and roentgen rays will cure more cases of tuberculous adenitis than any other method. Radiotherapy alone will cure over 90 per cent. of these cases.

2. Surgical treatment is always contra-indicated primarily in every case of tuberculous adenitis.

3. Those who still hold to radical operation will find the responsibility harder to shoulder with the ever-increasing recognition of the fact that tuberculous adenitis can be cured without it.

4. Hard, fibrous nodules following radiotherapy seldom ever contain any tuberculous foci, but it may be advisable to remove these nodules through a small incision the same as a foreign body.

5. It is to be remembered that large cervical glands may be due to sarcoma, Hodgkin's disease, leukemia, etc., and that radiotherapy is still the best form of treatment for multiple glandular tumors, but the end-results are not the same as when the enlargement is due to tuberculosis.

6. In the treatment of tuberculous adenitis in the future, when a more systematic raying is employed and when the cases are referred earlier, this method of treatment will be universally accepted.

SOME CONSIDERATIONS IN CONNECTION WITH GALL-BLADDER DISEASE.[1]

By Truman G. Schnabel, M.D.,
INSTRUCTOR IN MEDICINE, UNIVERSITY OF PENNSYLVANIA.

Someone has styled the left border of the sternum in its cardiologic relationship as the romantic area. If one might apply this phrase to the abdomen, few would disagree that the right upper quadrant is deserving of the same characterization. It is quite true that many times the diagnostic story in the right hypochondrium is told in a very real manner, but all too often little respect is shown for the truth and much is left to the imagination.

In this comparatively small area, easily covered by the outstretched hand, are found the antral portion of the stomach with the pylorus, the duodenum, the biliary system, including the gall-bladder, the head of the pancreas, the right kidney, the ascending colon and the hepatic flexure, to say nothing of the appendix. This close anatomic relationship alone is sufficient to explain the problems in differential diagnosis encountered in this region. Besides this the more or less common nerve supply going to all of these structures, sympathetic and vagal in origin, increases the diagnostic troubles many times. A lesion in any one has its reference in one or all of the other organs. This alliance seems to be especially close between the gall-bladder and the stomach. The relationship of the intercostal nerve supply to the abdominal wall and the splanchnic innervation to the underlying viscera explains the upper right rectus rigidity when it spreads its protective cover over each one of these

[1] Read at a meeting of the Northampton County Medical Society, Easton, Pa.

structures as it becomes involved in some inflammatory process. Further diagnostic difficulty is met with by the presence of an abdominal reference which supradiaphragmatic lesions have in the right upper quadrant, and we need not be reminded that the reverse is also true. How convinced is many a cardiac that his trouble is subdiaphragmatic and how often does the victim of a gall-bladder or gastric attack believe that his lesion is in or about the heart. A common embryologic origin with a similar blood supply also offers an excuse for additional diagnostic puzzles that arise in the gastro-duodeno-hepatico-pancreatic system as it has been styled by McCarty.

As we are prepared in our medical schools we hear at least two or three times more about chest diagnosis than about abdominal methods of investigation. The new house doctor too often makes the physical examination note "abdomen negative," which usually means that he is more or less at sea in abdominal diagnosis. Of course it is more sensational and at the same time easier to demonstrate a good presystolic rumble than it is to palpate a spastic colon, and it is more impressive to hear a metallic tinkle than it is to outline an air-distended stomach. All of which means that an especially difficult field of diagnosis is rendered more so by a failure to stress the abdomen in our undergraduate teaching.

We said that the gall-bladder is in this complex upper right abdomen, and it is superfluous to say to you who have had your baptism of fire that its lesions, their etiology, pathology, symptomatology, diagnosis and treatment, furnish some of the most baffling and at the same time most interesting of medical problems. It is not our purpose to make a formal presentation in the matter of gall-bladder diseases but rather to point the way to a profitable mutual discussion of the subject.

The most interesting diseases of the gall-bladder are cholecystitis and cholelithiasis. Other lesions are comparatively rare and almost impossible of clear-cut diagnosis. That these two conditions are usually present at the same time needs little emphasis, and that either can exist alone is difficult of refutation. We still believe that the leading etiological rôle in these diseases is an infectious one, and that stones are consequent upon the precipitation of cholesterin, bile salts, lime salts and other substances around some nidus, usually desquamated epithelium or bacteria. Just how this precipitation is accomplished is uncertain. The inflammatory lesion is always, we believe, bacterial in origin, and as Rosenow and others have shown, the streptococcal and colon group are the chief offenders. The typhoid bacillus no longer assumes the important rôle of earlier days as Chauffard and others have shown. There are those who champion an inflammatory lesion of the gall-bladder due to some chemical change in the bile; and there are those who speak very knowingly of biliary stasis and gall-stone formation. Another

group adhere strongly to the belief that a hypercholesterinemia of chronic or acute variety is responsible for stone-production. There is no good evidence, however, to show that an increased blood cholesterol, *per se*, is constantly associated with or responsible for cholelithiasis. Indeed, the testimony in the matter of this monatomic alcohol and its relationship in the animal economy, whether normal or pathologic, is very uncertain and conflicting. It is quite true that single stones, usually pure cholesterin, are found with no inflammatory lesion in the biliary tract; but then too, there is every reason to believe that inflammation and its bacterial origin may be completely erased in these structures as it can be in others. The factors of abdominal trauma, ptotic viscera and pregnancy make for interesting etiologic discussion. The increased incidence of gall-stones in women, of course, lends support to the correctness of these theories. All must know of the phrase "fair, fat and forty." It is quite true that a thin wiry type, especially in the male, seldom yields a gall-bladder diagnosis, and it is equally true that these lesions are emphasized with advancing age and increasing inactivity, but we can fairly assume that their origin goes back to an earlier day. There is then, we believe, no single etiologic theory that holds for all cases of gall-bladder disease. Each case, in all probability, has its own particular history.

It is largely artifice that leads to a distinction between cholangitis and cholecystitis. Usually the whole biliary tract is involved in an infectious process and it is difficult to conceive how the ducts may be affected and the gall-bladder remain free, or *vice versa*. The very close relationship between the integral parts of the biliary system makes it doubtful whether clinically a differential diagnosis can be made between a duodenitis, choledochitis, cholecystitis and a hepatitis; and, furthermore, this close interrelationship would seem to demonstrate the futility of taking out a gall-bladder in some cases if the ducts too are involved in the infectious process.

We shall not tarry in the matter of the pathology of gall-bladder disease nor with the stereotyped discussion of the composition of gall-stones. We might do the same for symptomatology, still there are some points deserving emphasis in this direction. These include the fact that the clinical picture varies in wide degree with the extent and severity of the lesion and the presence or absence of infection in combination with lithiasis. Initial nausea and vomiting, fever, pain and tenderness over Murphy's point, tenderness at the tip of the right eleventh rib, muscular rigidity and a large and tender gall-bladder constitute the story for vesical inflammation. With subsiding gall-bladder attacks there may only be tenderness in the right costovertebral angle as pointed out by Sailer. Jaundice may be present and a leukocytosis is a rather constant finding. Adding colic to this picture may make for a stone diagnosis, but such colicky pain may be attributable at times to cholecystitis alone. The pres-

ence of stones usually is productive of a picture of chronic inflammation manifested by long-continued or recurring attacks of indigestion. The symptoms are usually paroxysmal in type and may be most severe.

Gall-stone colic is variable in character. The history of a sudden, severe, agonizing pain in the right hypochondrium or epigastrium, and rarely in the left hypochondrium radiating to the chest or to either scapula, nausea, vomiting, prostration, weak rapid pulse, sweating, etc., generally labels such an attack as stone.

Colicky pains usually have their origin in one of these ways:

1. Adhesions of a gall-bladder no longer containing stones.
2. Adhesions when large stones are present in the gall-bladder and the cystic duct is patent.
3. Inflammatory processes in a gall-bladder distended by fluid or stones when the cystic duct is occluded by inflammation or by the presence of a stone in the neck of the gall-bladder.
4. The transit of a stone through the bile passages.
5. Inflammation of a dilated calculous common duct or its tributaries without impaction by stone. Jaundice in these conditions always is a variable feature dependent, in fact and degree, upon the relative completeness of bile obstruction.

Whether or not gall-stones can be latent occupies much discussion in the literature. Probably a careful anamnesis would always develop in the postmortem quiescent stone patient the story of "stomach trouble," "indigestion," "dyspepsia," etc. On the other hand there is evidence to show that innocent stones are not a myth, and that, too, in well-observed cases. Clark reported 86 incidental gall-stone cases in connection with pelvic operations including 19 cases absolutely free of symptoms referable to the biliary tree.

A thickened cicatrized gall-bladder manifestly is not palpable and must be interpreted in the light of Courvoisier's law as being due to stone impaction. The other half of the law implies that a chronic palpable gall-bladder is consequent upon some extra duct obstruction, such as carcinoma of the head of the pancreas, etc. We need not dwell upon the Charcot type of intermittent fever in connection with these cases. Common duct, and cystic duct obstruction by stones are followed by many interesting conditions.

It is an easy matter to draw pictures for didactic purposes, but unfortunately disease does not always run true to type. All that may be said about diagnosis fails in certain cases. Volumes might be written on the various differential possibilities over against gall-bladder disease. I shall be content with merely mentioning some of them: gastroduodenal ulcer, appendicitis, renal calculus, intestinal obstruction, dilated duodenum due to ligamentous adhesions at the duodenojejunal junction, crises of tabes, cardiac lesions, especially with decompensation and angina pectoris; pneumonia, aortic aneurysm, Pott's disease, visceroptosis, abdominal adhesions,

pancreatitis, peritonitis, lead colic, twisted ovarian pedicle, etc. The picture of gall-bladder disease is much altered by neighborhood adhesions of the thick variety or even by actual adhesions of the gall-bladder to the duodenum, pylorus, pancreas and colon.

Can we expect any diagnostic assistance from the roentgen ray? In a variable percentage of cases gall-stone shadows are obtained. Some roentgenologists claim this percentage as high as 50 while a conservative estimate must be placed at 20 per cent. The demonstration of diseased gall-bladders is likewise a procedure of uncertainty and great difficulty. Some roentgenologists claim 25 per cent. accuracy in this direction while others are not as sanguine. It is the calcium salts, of course, that cast the stone shadows.

We have suggested that there is no good evidence to show that gall-stone formation results from a hypercholesterinemia, *per se*, and that the evidence in the literature is contradictory on this point. Our own experience leads us to believe that blood cholesterol estimations confuse rather than clear up a gall-bladder diagnosis. Hypercholesterinemic figures are obtained in lesions other than biliary ones and the results obtained for a given disease are inconstant in individual cases and variable in a group of identical cases. It is quite likely that hypercholesterinemia and an increase in bile cholesterol are factors in gall-stone formation, but we have not as yet solved the pathologic physiology.

The examination of the duodenal contents offers a promising means of arriving nearer the truth in gall-bladder disease than many things thus far suggested. The technic is rather long and tedious, requiring extensive experience in the matter of interpretation. The best results are obtained by passing an approximately sterile duodenal tube into the fasting stomach; 75 to 80 cm. of the tube are swallowed and the patient lies on the right side. Sometimes elevation of the pelvis facilitates the passage of the capsule into the duodenum. This procedure is preceded by an attempt at sterilization of the upper respiratory tract by Dobell's solution or spraying and gargling with some antiseptic solution, *e. g.*, a potassium permanganate solution, 1 gr. to the ounce. The stomach, too, is washed out by a liquor antisepticus alkalinus solution in the continual secretion cases and weak hydrochloric acid solutions are used in the subacid cases. A variable amount of time is required for the tube to pass over into the duodenum, but when it does so a bile-tinged return may or may not be obtained. The tap should be alkaline. This technic accords with that utilized by Lyon, who recently gave the investigation of the duodenal contents an added stimulus and emphasized the contentions made by Einhorn and others a number of years ago.

In 1916, at the meeting of the American Gastro-enterological Society, Meltzer promulgated his theory of contrary innervation as applied to the biliary apparatus. In a footnote attached to this

report he says: "I make, therefore, the suggestion to test in jaundiced and biliary colic a local application of a 25 per cent. solution of magnesium sulphate by means of the duodenal tube. It may relax the sphincter of the common duct and permit the ejection of bile and perhaps even the removal of a calculus of moderate size, wedged in the duct in front of the papilla of Vater." Lyon took advantage of this footnote and now douches the duodenum with a 25 per cent. magnesium sulphate solution, which is followed frequently by a richly colored return flow of bile through the duodenal tube. The examination of this bile chemically, bacteriologically and cytologically affords a possible means for better diagnosis in a limited number of cases. These include the extensive inflammatory lesions along the biliary tract as well as the common and cystic duct obstruction cases. In the former cases the presence of an excessive amount of degenerated epithelium, leukocytes and an unusually rich bacteriology serves as a criterion for a positive infection diagnosis. If no bile whatever is obtained when the duodenal capsule is properly placed we may assume common duct obstruction, and if no dark colored bile is returned after Epsom salts douching a blocked cystic duct or a functionless gall-bladder may be inferred.

This procedure of tapping and douching the duodenum affords a diagnostic aid and may be a means of treating infectious processes along the biliary tract. The use of other substances than magnesium sulphate, such as olive oil, calomel solutions, a 2 per cent. solution of hydrochloric acid and a cup of bouillon, serves to call forth an abundant bile drainage. This drainage method becomes a seemingly rational means of treating, *e. g.*, acute catarrhal jaundice. Weak antiseptic solutions of argyrol or ichthyol, as suggested by Einhorn, may be utilized daily in a therapeutic way through the duodenal tube.

We find that little stress can be laid upon the gross appearance of duodenal tube bile as indicating normality or pathology. A turbid bile may be found in continuous gastric secretion cases when there is no gall-bladder lesion. A weak hydrochloric acid solution serves to render a bile solution cloudy. In our experience bile of all colors, viscosity and transparency may be obtained in normal cases. We do not subscribe to the possibility of diagnosing differentially by this means a duodenitis, cholecystitis, choledochitis or a hepatitis. The duodenum receives the gastric, biliary, pancreatic and duodenal secretions and to segregate them seems well-nigh impossible. The bacteriology of duodenal taps require careful study and involves a most difficult and uncertain field of study. Many organisms are reported as being obtained normally and pathologically. We have principally found members of the colon group. The pneumococcus is reported by some men. Just how this fact can be reconciled with the general bile solubility of this organism is difficult for a non-bacteriologist to explain.

The rôle of the gall-bladder as a focus of infection in extrabiliary pathology is deserving of much thought. In our experience we have noted very little influence derived from excision of a diseased gall-bladder in such cases as multiple arthritis. Generally these cases are well advanced when this is tried and naturally very little can be done. As a matter of fact the subject of focal infection is a many-sided and complex one, so that it is dangerous to draw conclusions even on an extensive experience in this field.

It has been both unfortunate and fortunate at the same time that in recent years there has been a domination of our ideas by surgical conceptions. In the matter of gall-bladder disease, as well as in other conditions, the viewpoints of the family doctor, the gastro-enterologist and the surgeon are different, and therefore their conclusions do not harmonize. The general practitioner sees the first attack of cholecystitis and sees many such bladders yield to ordinary medical procedures never again to cause trouble. The gastro-enterologist sees the chronic dyspeptic and the surgeon in his turn sees well-advanced pathology. We know of nothing that will influence the fate of gall-stones other than surgery, but we do not believe that primary attacks of cholangitis or cholecystitis belong to this therapeutic field. We do assign to the surgeon gall-bladder disease of early chronicity because of the frequent tenacious persistence of infection in the gall-bladder wall and surrounding lymphatic system. This affords the possibility of a focus of infection for other parts of the body as well as fresh outbreaks in the biliary tract itself. Drainage by way of the duodenal tube and even by cholecystostomy can offer no hope in the chronic case with gall-bladder wall infection; indeed, duodenal tube installations in any event can offer little advantage over the time-honored method of taking Epsom salts by mouth.

Whether or not the operation is to be one of cholecystostomy or cholecystectomy offers a fine opportunity for sound judgment on the part of the operator. Both procedures are followed by successes, by failures and by reformed or overlooked stones. Routine cholecystectomies are to be condemned as all routine treatment should be. A badly inflamed bladder with impacted stones in the cystic duct; an old, thickened gall-bladder; a bladder distended with clear fluid; suspicious bladder malignancy; a strawberry gall-bladder with no stones and extensive pericholecystic adhesions should indicate a cholecystectomy. To take out the gall-bladder is not exactly comparable to an appendectomy. The former has a distinct function in accomplishing the concentration of hepatic bile and pancreatitic juice. Continual bathing of the duodenum may serve in a reflex way to be responsible for the frequency of anacidity or even an achylia gastrica in these postoperative cases, to say nothing of other sequelæ. In common-duct strictures and pancreatitis it is often of distinct value to retain the bladder for future cholecyst-

duodenostomy or cholecystenterostomy purposes. The controversy in the matter of cholecystostomy *versus* cholecystectomy is not for us to decide, but we wish to put in a plea for the careful non-routine gall-bladder surgery. Such surgery is indicated in any case of early chronicity and stones. With the finding of one or more gall-stones in a relatively normal gall-bladder, further search should always be made for other abdominal pathology. A duodenal ulcer, for example, may be the real cause of trouble in such a patient. Sometimes in primary gall-bladder attacks operative interference may be required for gangrene, empyema and rarely perforation. Gall-bladder disease is seldom immediately dangerous, always remotely so. The appendix nearly always threatens life. An operation on the acute appendix nearly always relieves. In the case of the gall-bladder this is not always the case.

The surgeon always claims to prefer gall-bladder surgery only after a thorough medical treatment has failed. Such medical treatment at times is very successful while at other times it seems to be of little avail. The early institution of proper diet to control the gastric symptoms and to offset the intestinal stasis is often of prophylactic help in the purely inflammatory gall-bladder cases. Most of these patients are badly constipated and experience their worst attacks if intestinal peristalsis is cut down. We question the value of hexamethylenamin and salicylic acid as antiseptics in these cases. The cholagogues may have their therapeutic place here, but we believe what most of these agents accomplish is the release of gall-bladder bile into the duodenum, and that they do not especially influence bile formation. An active outdoor life seems to help many gall-bladder patients; on the other hand, there are times when exercise seems to aggravate acute attacks. In the light of Meltzer's theory infrequent and insufficient feeding may be conducive to biliary stasis and stone formation, so that frequent feeding perhaps promotes biliary drainage and helps infected cases. For the acute attack we know of nothing better than hot-packs, rest in bed and the judicious use of salines. In stone colic usually we, of course, need morphin and atropin. Experimentally, it is said that urotropin and iridin influence gall-stones. The same is said to be true of "Harrowgate old sulphur water," and barium chloride is supposed to stimulate the gall-bladder.

That gall-stones predispose to cancer is a point for much argument. It is true that a high percentage (70 to 90) of operated primary carcinoma cases of the gall-bladder is accompanied by stone. This is not true for primary duct carcinoma. Whether the stones do not frequently follow rather than precede the carcinomatous change in the gall-bladder is also a matter for dispute. Primary bladder malignancy is sometimes accompanied by stone formation, and there are cases which develop bladder cancer some years after stones have been removed or it may develop at the old cholecystos-

tomy site. Secondary carcinoma of the gall-bladder seldom is accompanied by stones because of the comparatively short duration of the disease and also because the invasion is by way of the serous coat of the bladder. It would seem rather that cancer of the gall-bladder is more prone to follow ulcerative processes and their consequent cicatrices than upon the mere presence of stones, just as we believe to be the case in gastroduodenal carcinoma.

In conclusion, we wish to emphasize the great difficulties of gall-bladder disease diagnosis in many cases. We have indicated some of the reasons why there is such difficulty. Frequently one must depend upon clinical intuition, and often William Mayo's dictum is realized upon "that where there is trouble in the right upper quadrant only a laparotomy will reveal the exact cause of the trouble." This should be true in fewer instances if we combine the evidence obtained by good, careful history-taking, physical examination, laboratory and roentgen-ray study. The case of long-standing indigestion, gas, eructation, etc., with perhaps interpolated acute abdominal attacks, is more or less typical, although the picture of gall-bladder disease is a variable one. The possibility of latent stones and some theories for gall-stone formation are mentioned. The relationship of cancer and gall-stones is indicated and some points are made in the controversy between those who practice cholecystotomy or cholecystectomy as an operation of choice. The study of duodenal contents is mentioned as a diagnostic aid and the practice of duodenal lavage in catarrhal jaundice and primary acute gall-bladder attacks is mentioned as a possible therapeutic measure. After any degree of gall-bladder chronicity is attained such lavage or medical measures are of little avail, and, indeed, frequently the problem is not met by surgery.

PHYSICAL EXERCISE IN HEART DISEASE.

By Theodore B. Barringer, Jr., M.D.,
NEW YORK.

(From the Cardiac Clinic of the New York Hospital.)

One of the important things which physicians have learned from their war experience is that physical exercise plays a dominant role in the hygiene of normal men and that certain circulatory disorders, variously termed *effort syndrome, neurocirculatory asthenia*, etc., may be benefited by the same measure. With no more than this experience it would seem reasonable to believe that a therapeutic measure as valuable as exercise has proved itself to be might be useful in circulatory disorders of a more serious nature.

The great drawback even to experimenting with exercise in disease of the heart has been the difficulty of determining just when a patient's heart was overtaxed by physical work and a lively fear of the results of such an overtaxing. Physicians have been extremely cautious about advising these patients to exercise. Generally the advice has been to be careful not to overdo and a very potent therapeutic measure in circulatory disease has been gradually discarded.

The term *exercise tolerance* has been frequently used of late and the implication has been that the above-mentioned difficulty has been solved. Actually the same dilemma confronts us. This term simply puts before us the conception that we can best judge of the heart's reserve power by the way a person tolerates exercise rather than by various other procedures. This conception is undoubtedly valid, for the best way to judge of an organ's capability is to set it doing its own particular work and base our judgment upon the result of such experiments. A person's ability to tolerate physical work depends essentially upon his heart's reserve power provided his lungs and body muscles are functioning in a normal way. Inability to tolerate a given amount of work means that the heart's reserve power has been overtaxed,[1] and the problem of deciding when this occurs is no different from what it has always been.

The fact that the term *exercise tolerance* expresses the correct method of ascertaining the amount of cardiac reserve power, would seem enough justification for its adoption. It has, however, a certain drawback. We have no form or amount of physical work which will serve as a standard capable of being translated into other forms of physical activity. A patient's heart may easily tolerate the exercise of walking on a level and be decidedly overtaxed by climbing a short flight of stairs. To speak of a person's *exercise tolerance*, therefore, without qualifying the word *exercise* means but little.

A brief summary of what we know about the circulatory physiology of physical work and of some experiments on patients with different amounts of cardiac reserve power will give us an insight into the principles to be followed in prescribing exercise in heart disease.

Circulatory Physiology of Physical Work. The salient phenomena accompanying muscular work are a rise in arterial pressure, a larger output from the heart and an increased flow of blood through the heart and working muscles.

The rise of blood-pressure is due to the increased output of the heart into a stream bed which has been narrowed by constriction of the splanchnic vessels. The rise implies, therefore, that the heart is able to increase its output and that the vasomotor center is acting upon the splanchnic vessels. Chiefly by means of the

[1] Bainbridge, F. A.: The Physiology of Muscular Exercise, 1919, p. 138.

increased blood-pressure are the heart muscle and working muscles provided with more blood—that is, with oxygen sufficient to satisfy the increased metabolism incident to work.[2] A subsidiary factor in producing the increased blood supply is relaxation of the arterioles and capillaries in the working muscles and of the coronary vessels in the heart. The rise of systolic blood-pressure during work is the most significant fact in the circulatory physiology of muscular exercise. It means that the heart is acting more energetically, that it is increasing its output and that the heart muscle is being supplied with more blood.

The course of the blood-pressure during work has been determined by a number of observers, and the course after work has been even more carefully investigated because of the easier technic. The relation between the pressure during work and that after work has received little attention.

In 1916 I published a record of experiments upon three normal people and upon two patients suffering from cardiac disease in whom the systolic blood-pressure curve was plotted during and after the performance of work.[3] In the three normal persons it was shown that the pressure rose *during* work and the degree of rise was proportional to the intensity of this work; also, that the height of blood-pressure during the first sixty seconds *after* work approximated the height reached during work. The records then published of the experiments on two patients with cardiac disease were incomplete because of the infrequent readings made during work. These latter experiments have been repeated.

Three patients were selected having different degrees of cardiac reserve power. The first patient was confined to bed and suffered from aortic regurgitation and a marked cardiac failure. His legs were much swollen, there was some fluid in the abdomen and he was dyspneic.

The second patient had a chronic myocarditis and auricular fibrillation. He was able to be up and about, but his ankles showed almost constantly some edema and his heart's reserve power was very slight.

The third patient had a double mitral lesion and a moderate reserve power. She could walk about and do light household work.

Twenty-five experiments were carried out on these three patients. Work was furnished for the bed patient by alternately flexing the thighs on the abdomen and for the walking patients by the same maneuver, the patients standing during the work. Each working period lasted from thirty seconds to two minutes. Naturally the rate at which they worked varied considerably. The longest period of work always resulted in overtaxing the patients' hearts, earlier or later in the working period, as was shown by their marked dyspnea

[2] Bainbridge, F. A.: The Physiology of Muscular Exercise, 1919, p. 86.
[3] Barringer, T. B., Jr.: Arch. Int. Med., 1916, xvii, 363–381.

and fatigue. The blood-pressure was read every ten seconds by auscultation *during* and *after* work. The following charts depict a typical series of experiments in each patient and also the same experiments in a control with normal heart.

These experiments show the following facts: *During work* the pressure rose and reached its highest figure during the greatest

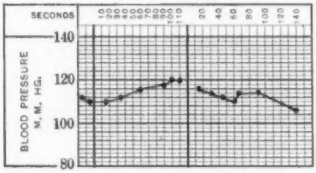

CHART I.—Curve of systolic blood-pressure during and after work in a normal person. Space between the two heavy perpendicular lines represents working period. Work furnished by flexing the thighs alternately on the abdomen at a rapid rate.

amount of work. *After work* the rise noted was, in the majority of instances, greater than that observed during work, and from its height we gained an idea of the height which had been reached during work. A "delayed rise" and prolonged fall were noted whenever the work overtaxed the heart. The rise in pressure both during and after work was much more marked than was noted in the normal control. Very small amounts of work produced very marked rises in blood-pressure in these patients with damaged

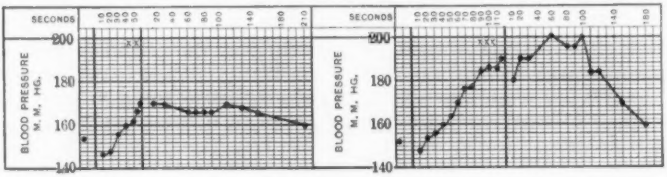

CHART II.—Curve of systolic blood-pressure during and after work in patient C. R., confined to bed, suffering from aortic regurgitation and extreme cardiac failure. Legs swollen; free fluid in abdominal cavity. Space between the two heavy perpendicular lines represents working periods of sixty and one hundred and twenty seconds respectively. At x^2 patient was dyspneic. At x^3 patient was very dyspneic (respirations 43 per minute) and fatigued, and it was apparent that he could work but a few seconds longer.

hearts. It would require very much larger amounts of work to produce as great rises in normal persons. We have seen that the increased cardiac output is the chief factor in producing the rise in blood-pressure in normal hearts. It seems very improbable that a damaged heart could increase its output enough to cause such high blood-pressures, as we have noted in our experiments, particularly

since the work was very small in amount. It is caused much more probably by an exaggerated activity of the vasomotor center.[4] This high pressure makes it increasingly difficult for the ventricle to empty itself, thus tending to produce an insufficiency.

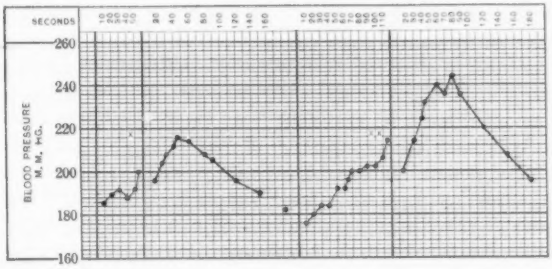

CHART III.—Curve of systolic blood-pressure during and after work in patient J., suffering from chronic myocarditis, cardiac hypertrophy, auricular fibrillation and moderate cardiac failure. Patient was up and about but showed almost constantly some pretibial edema and could not climb a short flight of stairs without distress. Space between the two heavy perpendicular lines represents working periods of sixty and one hundred and twenty seconds respectively. At x^1 patient dyspneic; at x^2 decidedly dyspneic and exhausted. In reading the blood-pressure the height at which the first strong beats came through was recorded. It is interesting to note that the heart in this patient with auricular fibrillation reacted to exercise in the same manner as did the other patients with rhythmical heart action.

Up to a certain limit exercise must act upon a damaged heart exactly as it does upon a normal heart; that is, increase the cardiac output, increase the blood supply of the heart muscle and raise the blood-pressure. As soon as this limit is exceeded the patient becomes markedly dyspneic, the excessive rise in blood-pressure

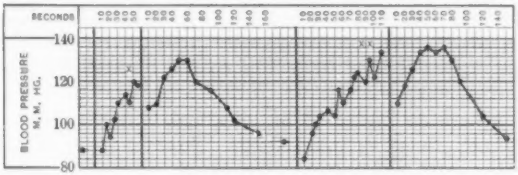

CHART IV.—Curve of systolic blood-pressure during and after work in patient D., suffering from mitral stenosis and regurgitation and small cardiac reserve power. She was able to do light housework and exercise as shown in Table I. Space between two heavy perpendicular lines represents working periods of sixty and one hundred and twenty seconds respectively. At x patient dyspneic. At x^2 respirations were 48 per minute and it was apparent that patient could work but a few seconds longer.

we have described ensues and a temporary insufficiency is produced. The heart's reserve power has been exceeded. Naturally, when a heart has no reserve power, as in Case II, no exercise, however

[4] Personal communication from Dr. F. A. Bainbridge.

Walking is perhaps the best example of the second, milder type of exercise. This should be at first on a level. The patient should not talk and should not walk against a strong wind. A certain distance should be covered at a fairly rapid gait which can be determined only by experiment and then the patient should rest for two or three minutes; then repeat the walk and rest.

Other forms of mild exercise suitable for heart patients are croquet-playing, setting up exercises in which the arms and legs and not the trunk are moved and dancing (limited to one step). As the patient's reserve power increases one of the more energetic types of exercise should be added to the daily regimen. Whatever the exercise it should be determined on two successive days by the methods outlined above if it overtaxes the patient's cardiac reserve power.

A comparison of walking, stair-climbing and swinging dumb-bells by the same patient will give a quite correct idea of the relative intensities of these different forms of physical activity.

TABLE I.—D. B., AGED TWENTY-TWO YEARS; MITRAL REGURGITATION AND STENOSIS; SMALL CARDIAC RESERVE POWER. IS WALKING ABOUT AND DOING VERY LIGHT HOUSE WORK.

Date.	Stair climbing.	Walking on level.	Swinging 1-pound bell.
1920.	10 *feet rise in* 15 *seconds.*	400 *feet in* 2 *minutes.*	10 *times in* 20 *seconds.*
May 16	Pulse before . . . 72	Pulse before . . . 78	Pulse before . . . 84
	Pulse after . . . 120	Pulse after . . . 120	Pulse after . . . 112
	Blood-pressure before . 96	Blood-pressure before . 96	Blood-pressure before . 100
	Blood-pressure after . 126 (highest)	Blood-pressure after . 124	Blood-pressure after . 126
	Delayed rise and prolonged fall present.	Normal curve of blood-pressure.	Delayed rise and prolonged fall present.
	Respiration before . 28	Respiration before . 24	Respiration before . . 24
	Respiration after . . 42	Respiration after . . 36	Respiration after . . 36
	22 *feet rise in* 30 *seconds.*	960 *feet in* 4 *minutes.*	15 *times in* 30 *seconds.*
	Pulse before . . . 72	Pulse before . . . 78	Pulse before . . . 84
	Pulse after . . . 132	Pulse after . . . 132	Pulse after . . . 132
	Blood-pressure before . 92	Blood-pressure before . 98	Blood-pressure before . 100
	Blood-pressure after . 142	Blood-pressure after . 128	Blood-pressure after . 132
	Delayed rise and prolonged fall marked	Delayed rise and prolonged fall present	Delayed rise and prolonged fall present
	Respiration before . 28	Respiration before . 24	Respiration before . . 28
	Respiration after . . 56	Respiration after . . 42	Respiration after . . 42
June 7	10 *feet in* 20 *seconds.*	1360 *feet in* 6 *minutes.*	*Swinging* 5-*pound bell* 10 *times in* 20 *seconds.*
	Pulse before . . . 66	Pulse before . . . 60	Pulse before . . . 66
	Pulse after . . . 88	Pulse after . . . 108	Pulse after . . . 100
	Blood-pressure before . 90	Blood-pressure before . 86	Blood-pressure before . 84
	Blood-pressure after . 108	Blood-pressure after . 106	Blood-pressure after . 108
	Normal curve of blood-pressure	Normal blood-pressure curve	Normal curve of blood-pressure
	Respiration before . 24	Respiration before . 28	Respiration before . . 24
	Respiration after . . 32	Respiration after . . 36	Respiration after . . 32
	22 *feet in* 30 *seconds.*		15 *times in* 30 *seconds.*
	Pulse before . . . 66		Pulse before . . . 64
	Pulse after . . . 120		Pulse after . . . 120
	Blood-pressure before . 88		Blood-pressure before . 88
	Blood-pressure after . 120		Blood-pressure after . 116
	Delayed rise and prolonged fall present		Delayed rise and prolonged fall present
	Respiration before . 24		Respiration before . . 28
	Respiration after . . 42		Respiration after . . 48

Table I shows that on May 16 this patient could not swing a one-pound bell ten times nor climb a short flight of stairs without overtaxing her heart. She could, however, walk 400 feet on the level with normal reactions. On June 7 she showed decided improvement, for she was able to do some stair-climbing, swing a 5-pound bell ten times and walk much farther without overtaxing her heart. At this date she was put on both energetic and mild forms of exercise.

It is a difficult matter to translate any given amount of a particular form of exercise into other forms of physical activity. It can be stated, however, from a number of experiments on different patients similar to the ones just quoted, that a patient who can swing a 5-pound bell ten times in twenty seconds can climb slowly a flight of stairs with a 10-foot rise, can walk easily on the level and can perform light, physical work without overtaxing the heart. A patient who can swing a 10-pound bell ten times without overtaxing his heart can walk as long as one-half hour up a slight grade and can play nine holes of golf over not too hilly a course.

Stair-climbing and swinging dumb-bells afford, perhaps, the best test exercises for heart patients. The test of hopping on one foot 100 times, which was much used in the army, is thoroughly unsuitable because the actual amount of work performed and the time of performance vary greatly with each individual. The work done depends upon the height which the body rises with each hop. This varies with each person and varies even in the same individual, for the later hops are lower than the earlier ones; again, the time taken to perform this test varies greatly. Obviously, then, with these two variables the amount and the rate of work the circulatory reactions will differ greatly and afford no basis for comparison.

It must be emphasized that exercises should not be given to patients who are suffering from even a mild reinfection of a diseased heart, nor should they be given until such an infection is well over, as shown by a normal temperature for from five to seven days. The administration of digitalis to a patient is not a contra-indication to exercise, for we have exercised such patients many times with benefit. Digitalis favorably influences the action of the heart during exercise, as we shall show in a later paper.

There is another adjunct to exercise of much importance, and that is weight-reduction in patients who are overweight. Heart patients are inclined to grow stout because of the enforced limitation of their physical activities and because of lack of specific dietetic instructions. I have been impressed with the fact that exercise in conjunction with weight-reduction produces a more rapid and more marked increase of the heart's reserve power in these patients than does exercise alone. The reasons for this are not clear. Changes in the total metabolism, the slight increase in the size of the stream bed due to the formation of new capillaries in the fatty tissue, better pulmonary ventilation—probably all these play a part.

The history will be summarized of one patient who represents a class in which particularly excellent results were obtained by this procedure.

Mrs. M., aged seventy years. For ten years she had suffered from angina pectoris. This had steadily grown worse until, in 1919, she was unable to walk at all without causing an attack of pain and dyspnea. On January 8, 1920, I first saw this patient in an attack of pulmonary edema. She was a very obese woman, 5 feet, 2 inches tall, weighing 200 pounds, and seemed to be on the point of death. Her pulse was 120 per minute, regular rhythm, and her blood-pressure 140–80. The heart sounds could not be heard because of the moist rales heard all over the lungs. Her electrocardiogram taken later showed slight myocarditis and a left ventricular predominance. She recovered from the attack and was put on tincture digitalis, diuretin and a strict diet of four glasses of milk, two glasses of water and six soda biscuits daily, with rest in bed. The following table summarizes her course of treatment:

TABLE II.—COURSE OF TREATMENT IN PATIENT MRS. M.

Date.	Weight.	Diet.	Exercise.	Remarks.
1920.				
Jan. 8	200	800 calories: 6 soda biscuits 4 glasses milk 1 glass water	Rest in bed until Jan. 29	Tincture digitalis and diuretin.
Feb. 12	180	1100 calories: 1 egg 1 portion vegetable 1 slice bread and butter 6 soda biscuits 4 glasses milk ½ grape-fruit Stop fluid restriction	Up and about room	Stop digitalis and diuretin.
Feb. 21	178¾	The same as on Feb. 12	Walk one block—5 closes;	
Mar. 11	175¾	1500 calories: 1 lamb chop 2 slices bread and butter 6 soda biscuits 1 portion vegetable 4 glasses milk 1 lettuce salad ½ grape-fruit	Walk two blocks—8 closes; light calesthenics (flex thighs on abdomen alternately ten times while standing—3 closes)	
Mar. 17	173	The same as on Mar. 11	The same as on Mar. 11	
Mar. 24	171¼	The same as on Mar. 11	Increase walking and calesthenics	
April 14	166	2000 calories	Walk four blocks—10 closes; calesthenics (flex thighs 12 times—6 closes)	No precordial pain during exercise.
May 26	165	No dietetic restriction except meat but once daily; weight not to be increased	Walk sixteen blocks—3 closes; climb 1 flight of stairs 15 feet	No precordial pain during exercise.

The calisthenics noted above belong to the mild type of exercise, for each close produced no greater rise in blood-pressure than from 10 to 20 mm. of mercury.

Summary. At the end of six months this patient had lost 35 pounds in weight and was able to walk three-fourths of a mile without stopping and climb one flight of stairs without producing any anginoid symptoms. This compares very favorably with her condition during 1919, when she was unable to walk at all because of attacks of angina caused thereby.

I have found fluid restriction of minor importance compared with weight-reduction except in patients who have considerable edema. It has been a difficult matter to convince patients that weight-reduction means less work for the heart to do, and many physicians feel that the reduction of weight in heart patients is a dangerous procedure unless done very gradually and very moderately. In the past five years in approximately thirty patients I have never seen "weakening" of the heart result from even a radical weight-reduction if at the same time the patient was exercised properly.

In the light of our knowledge of the circulatory physiology of exercise it seems quite certain that physical exercise must not only increase the resistance to general infections of patients with heart disease, exactly as it does in normal people, but that in all probability it makes the heart itself more resistant to the serious menace of reinfections.

There can be no excuse in the majority of instances for advising heart patients against exercise nor any reason for not being specific and definite when prescribing this valuable therapeutic measure.

OCCULTISM WITH PARTICULAR REFERENCE TO SOME PHASES OF SPIRITISM.[1]

By Charles K. Mills, M.D., LL.D.

EMERITUS PROFESSOR OF NEUROLOGY IN THE UNIVERSITY OF PENNSYLVANIA AND CONSULTING NEUROLOGIST TO THE PHILADELPHIA GENERAL HOSPITAL.

The term, "occultism" is derived from the Latin, meaning hidden or concealed. As sometimes used the word has a special significance, referring to Oriental sects or cults which concern themselves with religious mysteries like the Vedanta or theosophy. Theosophy is a particular phase of occultism, its disciples believing, as the name implies, that they have a direct knowledge of God through spiritual intercommunication. In comparatively recent years the theosophy of the East has found disciples in the Western

[1] Presented to the Philadelphia County Medical Society, January 12, 1921.

World and now is represented by a considerable following in various localities of England, the European continent and America.

Forms of theosophy have flourished under other names as Neoplatonism and Swedenborgianism.

The most exploited apostle of theosophy, at least in the early days of my interest in matters of this description, was Madame Helena Petrovna Blavatsky, a Russian who travelled in India and elsewhere in the East and later became one of the founders of a theosophical society about 1875. She stayed for a time in London, where she attracted much interest in society and in pseudoscientific bodies. Her tricks and false assumptions were exposed by Richard Hodgson. It is interesting to note that in spite of this exposure the theosophists, or many of them, still give their adherence to her teachings and still uphold her as an inspired exponent of spiritistic doctrine. Evidently, from what I have read of Blavatsky, she was a trickster and so-called medium, which often means the same thing.

Even in recent days it has been held, as it was of Blavatsky, that it does not impair the value of a medium's power to communicate with spirits not of this world to prove that she is a fakir.

The term "mysticism," as commonly used, is more or less synonymous with occultism. It has been briefly defined as the "*belief in a third kind of knowledge*," that is, knowledge which is neither perceptual nor inferential. But I must leave a discussion of these points to our friends the psychologists.

The question of paramount interest since the recent revival of spiritualism is whether or not communication can be held between the spirits of another world and the inhabitants of this. The anecdotal literature of such communications has been enormously increased since the beginning of the World War. Millions have "gone west" or to "the other side," and it is claimed that not a few of this immense host have communicated with their bereaved relatives.

Why has the world recently become fascinated by the study of occult phenomena? The horrible sacrifice of life since 1914 has doubtless acted as an exciting cause, but back of this is a more profound reason. The phenomenon is due to a resurgence of that which is primitive. Edward Clodd, in the *Fortnightly Review*, says: "Man felt before he reasoned. As a creature of emotion he has an immeasurable past; as a creature of reason he is only of yesterday."

War, and especially a great and terrible war, arouses the instinctive and emotional in the human race. It removes man for the time being from the control of sound reasoning. On the principle of the first organized the most organized—the first to come the last to go—untutored men, and in particular instances intellectual men, through the domination of feeling and emotion, revert more or less to the same domain of mysticism that held in thrall their savage or half-civilized ancestors. Instinct and emotion for a time largely

hold the field. Even crime so prevalent today is best psychologically explained as a return under peculiar stress to instinctive tendencies.

It is not altogether true that the only great wave of spiritualism has been since the World War. In 1855, for instance, Professor Robert Hare spoke to an audience of three thousand people in the New York Tabernacle on the subject of spirit manifestations, a larger audience when the population of that time and this are compared than those to whom Sir Oliver Lodge delivered his lectures.

Some of my critics may say that it is all well enough to talk of the ignorant and mediocre human beings who, at least from the standard of knowledge of such subjects as philosophy and metaphysics, are 90 to 95 per cent. of the people of the world, that they are creatures of instinct and emotion, that their beliefs are founded on their superstitions and general mystic tendencies; but how is it to be explained that not a few of the great men of the earth—in the sense of their literary, scientific or technical accomplishment—should give their adherence to spiritualism?

What is to be said of Robert Hare, chemist and physicist; of Sir William Crookes, another great chemist; of Sir Oliver Lodge, physicist, astronomer and educator; of William James, the eminent psychologist; of Alfred Russell Wallace, Sir Arthur Conan Doyle, Sir W. F. Barrett, Camille Flammarion and Maurice Maeterlinck?

Of course I might in contrast to these men produce a goodly host of scientists and scholars who have not given their adherence to spiritualism. The list would include great names like Darwin, Huxley, Spencer, Tyndall, Leidy and many others who will be easily suggested.

It has been said with regard to some of the scientists that their conversion to spiritualism was in their advancing years, when their mental powers were probably failing. This, however, cannot be said of most of them. It is true that Robert Hare became an open advocate of spiritualism only a few years before his death, which occurred at the age of seventy-eight.

Sir William Crookes, however, who was born in 1832, expressed his belief in spiritualism as early as 1871, when he was scarcely forty years old.

Sir Oliver Lodge went into the "spiritualistic camp" before he was sixty. Others of the group to whom I have referred entered the same camp at varying ages.

I might advance a partial explanation. These men apparently at some time in their career have come to lead what might be termed a double mental life—not a double life of the Jekyll and Hyde sort of changing periods of virtue and vice, of criminal propensity and conventional acquiescence—but a life in which reason and investigation pursue their way side by side with instinctive and emotional tendencies. Some of these men probably

are the victims of inherited temperament; their hereditary strain impels them strongly toward the instinctive and emotional.

In my own experience I have had a few interesting exemplifications of such tendencies. I remember, for instance, a well-known Philadelphia surgeon, one time a teacher in the medical department of the University of Pennsylvania, the author of a text-book on a branch of surgery which long held its place as an authoritative treatise, an admirable practical surgeon in his chosen line of work. This man, nevertheless, side by side with his scientific and practical work, had curious tendencies toward philosophical and metaphysical inquiries in which he showed considerably less stability and power. Under a pseudonym he was the author of various philosophical or pseudophilosophical books, one of which referred especially to Plato and Platonism.

This gentleman was a personal friend of mine and loved to drop in at times and talk of Rosicrucianism, of Heraclitas, Plato, Aristotle or Bruno or some other of the brood of ancient and medieval philosophers. With all his acquirements he was a most childlike being. He would go, as one of our mutual friends told me, to some spiritualistic seance or meeting and allow himself to be fooled by the most crude and obtrusive frauds. Once he came to my house in a state of excitement and told me that he believed he had discovered the explanation of telepathy. He said he was confident that it was through the pineal gland and its peduncles that the phenomena of telepathy received their final accomplishment in the human brain; nor was he able to listen with any patience to my own exposition of the common views regarding the physiology of the pineal gland.

The adherence of some scientists to the more primitive or emotional forms of religion has been thought to have the same explanation as has just been expressed. I might give a number of illustrations of men of this type, but shall refer only to one.

Philip Henry Gosse (1810–1888), whose interesting story is told by his son, Edmund Gosse, in that remarkable book *Father and Son*, was a biologist of high repute. He was a member of the Royal Society and wrote a series of authoritative biological works, among these being *The History of the British Sea Anemones and Corals*, *The Ocean* and *Birds of Jamaica*. One or two of his books were speculative and religious in tone. In one he worked out a theory to justify himself as a strictly scientific observer, who was also a humble slave of revelation.

Philip Henry Gosse had been reared as a Wesleyan, but he became an active and militant member of the Calvinistic sect known in England as the "Plymouth Brethren." He was zealous in prayer and preaching, was narrow in his application of biblical teaching, had the spirit of a proselytizer, and withal he was an honest and upright man in his dealings with others. He and his son Edmund finally separated, after it became clearly impossible

for them to live in accord on religious matters. As in the case of the scientific spiritualists, the primitive, emotional or instinctive, in spite of his intellectual accomplishment, held the elder Gosse with an iron grip.

Let us now take up briefly a few points of special interest connected with the general discussion of the subject of spiritism. Ghosts or apparitions are intimately associated in the minds of the community with this subject. Ghost stories are as old, and probably older, than historic time; from Nippur and Babylonia, through all the Egyptian dynasties, in the period of Pericles and Plato, of Cagliostro, Robespierre and Anacharsis Clootz, in the days of the Fox Sisters and Robert Hare, and now in our own time of Sir William Crookes and Sir Oliver Lodge, the belief in spirits, visible or invisible, has held sway.

Close consideration of the voluminous literature of apparitions, as well as attention to one's personal experience, soon reveals certain facts which are applicable to all stories of ghostly visitants. In the first place some of these stories are clearly of the fake or fraudulent sort, of which it is hardly worth while to give examples.

The newspaper story of six mischievous boys arrayed in white, along a cemetery wall near one of our suburban towns, who affrighted several youngsters and female pedestrians, but were ignominously routed by a detail of police from a nearby station, is one of the crude sort.

In others a hysterical young woman is usually prominent who startles friends and neighbors by ringing doorbells, breaking furniture and otherwise disturbing the night.

I presume that there are few who could not recite unpublished tales of apparitions. I have myself a growing collection of ghost stories.

My colored chauffeur in reply to my query as to whether he had ever seen a ghost, replied that he was not quite sure, but he thought possibly he had seen the spirit of his grandmother. His story was that shortly after the death of the said grandmother he had been sleeping with two brothers in the room formerly occupied by the old lady. Just as he was passing into the sleeping state he heard a rattling at the window of the room, which opened on a porch. He saw the window raised and a form stepped into the room and over to the foot of his bed. He said she grew bigger and bigger and uglier. As the features of his grandmother grew he gave a shriek which wakened his sleeping brothers and gave the untimely visitor a chance to escape—for on awakening none of them could see their relative from the other world.

On questioning the man as to the garb in which his grandmother appeared, he said he was not quite sure but thought it was something like the white stuff which they show in the ghost pictures at the "movie" exhibitions. Whether he saw a ghost or not, he told me

very emphatically that he never slept in the room after that night and never proposed to do so again.

One of my distinguished friends, who is a cautious believer in spiritualism, told me a story, which I do not think has been published, about a ghost which appeared one night to a well-known financier and philanthropist of Philadelphia. The gentleman came from Europe on a liner, accompanied by a military officer, and both had been invited to be the guests of a New York friend of the latter.

Shortly after the financier had retired he saw near his bedside a beautiful woman, but on his rousing from sleep the visitant had disappeared. The next morning on entering the drawing-room the first thing that met his gaze was the full-length portrait of a beautiful lady, who he said at once was the visitor of the night before.

During the next day he told this story to his military friend, who, somewhat startled, remarked that it was extraordinary, as he had had the same visitation on the same night.

The relater of this story was apparently impressed with the evidential character of this ghostly yarn. It would not, however, bear full examination. In the first place the military man had been a close friend and admirer of the former wife of their host. What could be more likely than that in the disturbed sleep of this gentleman the visitation should have occurred, and in the second place, what more likely than that the other party to the drama should have interpreted the picture into his dream rather than the dream into the picture?

Omitting the plain cases of fraud or fabrication and the instances of purely literary handiwork, the ghosts which remain are best explained on the theory of hallucination. In saying this I do not mean to refer to those cases of visions and voices occurring among the recognizably insane, of which every alienist could produce many instances. It is significant, however, in discussing our subject to remember the intensity and certainty which these appearances and auditive phenomena have in the delusional mind.

A careful consideration of ghost stories which have come to my direct knowledge, or which have been read in the now enormous literature of the subject, shows that a large percentage of the experiences recorded have occurred in the period preceding deep sleep or in the aftermath of such sleep—in other words, in the predormitium or post-dormitium. Not only have we a well-marked predormitium and postdormitium but also what might be called an intradormitial period in which sleep becomes shallow without the occurrence of waking.

Under the head of disorders of sleep many interesting physical as well as psychical phenomena have been described by Weir Mitchell[2] and others as occurring in the time preceding or following

[2] Some Disorders of Sleep, Am. Jour. Med. Sc., August, 1890, N. S., vol. c, pp. 109–127.

profound slumber, and these, of course, may also occur in an intradormitial period. The probability is that when one is really plunged into deep, natural sleep no dreams occur, although apparitions may be present in the profoundly somnolent state of those who are suffering from toxemia or injuries of the head.

The evidence is fair that visual, auditory and other sensory hallucinatory dreams are as much a mark of disordered cerebral action as are such well-known phenomena as waking numbness, sleep paralyses and sleep clonisms. Time will not allow me to go into a discussion of these phenomena, in connection with which I could readily draw from my own neurological experience as well as from the writings of my colleagues.

In all probability the story told by a prominent clergyman of the visit from the spirit world of his former wife, who sat on the edge of his bed and revealed to him the place of concealment of a certain pen and papers for which he had long sought in vain, belongs in the category of predormitial dreams or hallucinations.

I was interested in reading one of the popular volumes of ghost stories by a woman evidently of considerable literary ability, to note how many of the ghosts which she had seen had come to her in haunted rooms and houses just before she passed into the full sleeping state. If we acknowledge that the insane can have vivid and impressive hallucinations which are fully believed in, and that the normal can have these in the state preceding and following deep sleep, it is not at all difficult to understand that persons of certain temperaments or constitutional tendencies, the so-called psychics of our ghostly literature, may have such appearances at any time. They are at all times cerebrally attuned for the reception of such impressions.

Consideration of occultism with particular reference to spiritualism would scarcely be complete without some discussion of mediums and mediumistic communications, including trance phenomena, table-tipping and automatic writing. The last phase, however, I will leave entirely to my psychological colleagues. It would be hardly worth while to encumber this presentation with any review of the voluminous literature of the subject, past and recent. I will simply refer to a few personal experiences, and very briefly, to Sir Oliver Lodge's *Raymond*.[3]

In the earlier years of my professional life, halcyon days of investigation not to be forgotten, I was deeply interested in hypnotism, and to a much less extent in questions like spiritualistic communication and telepathy. Regarding hypnosis I became convinced of the possibility of its production in one's self or in another. I entered upon the study of the phenomena of hypnotism stimulated by the then recent writings of Charcot and his school,

[3] Lodge, Sir Oliver: "Raymond," New York, George H. Doran Company, 1916.

with a view especially of clarifying my ideas on hysteria. My studies in so-called spiritualistic communications were far less extensive and rather along side lines of interest.

I became an infrequent attendant upon spiritualistic assemblies and occasionally took part in a so-called seance. I well remember certain gatherings in an old church on North Eleventh Street, where after we had listened to feeble renderings of "Nearer, My God, to Thee," or "Greenland's Icy Mountains," or some similar well-known religious refrain, one or more mediums, fat or fragile, sleek or frowsy, appeared on the platform. Usually after going through a series of extraordinary gurglings and gaggings, poses and contortions, these mediums passed into a real or bogus trance, during which, in somewhat incoherent and usually ungrammatical English, they delivered voluble messages from the "other side," with the assistance of the "Moonstones," "Red Feathers," "Fedas," "imperators, rectors, doctors or mentors—" or whatever names then held the mediumistic control field.

I was soon convinced that these exhibitions were vulgar frauds. These open meetings acted as feeders or advertisements of seances privately held and for a definite and often a considerable charge.

> "And not for nothing these gifts are shown
> By such as delight our dead,
> They must twitch and stiffen and slaver and groan
> Ere the eyes are set in the head,
> And the voice from the belly begins. Therefore,
> We pay them a wage where they ply at En-dor."

I can take time to recall only one or two seances which took the form of "table-tippings," or at least attempts at these phenomena. They serve to indicate my own views and the views of others as to their nature. On one occasion, the medium being a well-known author of novels or stories of Indian life, which appealed to the imaginative views of that time, several of us gathered around the table, the medium sitting opposite the center of the group. Attempts were first made, without any great success, to call up the spirits of some of our departed friends or relatives. I remember that my grandfather was sadly misrepresented as to the time, place and manner of his death.

As we sat around the table, our fingers lightly but firmly touching it, no effect upon the obdurate table became visible, but after a few minutes I noticed that the face of one of my friends had assumed a somewhat dreamy or foolish appearance and that his right hand began to make peculiar rotary movements, at first slow but gradually increasing in rapidity and amplitude. At once it struck me that he was passing into a unilateral hypnotic state, such as I had studied in one of my patients at the Philadelphia Hospital. I grasped his right arm and placed his hand on his head, remarking that he could not remove it, which he could not or did not. I then

put his head and upper extremities into various positions, where they remained in a cataleptoid state, until with a few strokes and a command I restored him to his usual condition.

In these early days two of my professional friends, both of whom became men of distinction in their chosen lines of biology or medicine, began to hold seances of their own after the manner of the table-tippers. I attended one or two of their exhibitions, one of these being before a medical society. No so-called medium was present, but the exhibitors placed their hands and fingers as in the table-tipping experiments. Their faces soon assumed an abstracted look. The obdurate table, as in my former experience, again refused to respond by tipping or other movement, but not so the experimenters. In a short time a tremulous movement took possession of the hands of one of them. This soon became a twitching. The movements extended up the limbs to the trunk, and after a brief interval the whole body of the participator was thrown into convulsive movements, these, in one instance, being so severe as to cause the exhibitor to be involuntarily thrown from his chair.

To my mind there is a distinct point in this recital which has to do with the explanation of the manner in which table-tippings and movements of a similar kind are brought about. Michael Faraday and others, but none of higher rank, have asserted their belief that such table-moving phenomena are due in some way to the exercise, sometimes unconscious, of muscular activity on the part of those seated around the table. The same concentration or abstraction of attention which could induce the hypnotic phenomena which I have just described might and sometimes does bring about such muscular action. I know it is said that the tables at seances at times continue to move after the removal of the hands which have started them. Most of these reports lack sufficient foundation, and even if correct may perhaps be explained by some sort of fraud.

As I have only space in this connection to refer to one or two other matters, let me turn for a moment to Sir Oliver Lodge's *Raymond*. I read this book, as I have other writings of Lodge, with the hope of obtaining some idea of the ground on which this physicist and philosopher stands. The first part of *Raymond*, which dwells upon the early life and soldier experiences of his gallant son, is full of interest and naturally appeals to the sympathies of those whose hearts go out toward the thousands of families who have been bereaved during the recent war.

In the third part of his book he deals with theoretical considerations and the explanation of spirit communications. While written in a scholarly manner it is simply another exposition by a man of literary ability of the old dualistic theory of spirit and matter. It is about as convincing or unconvincing, according to one's previous point of view, as Sir Oliver's lectures in this country, one of which I attended.

In the second or middle portion of his book *Raymond*, Sir Oliver deals with the mediumistic communications which he and Lady Lodge and other members of his family were supposed to have had with Raymond, talking to them from the "other side" through a medium and control. The gullibility with which he swallows the communications of such proved fakirs as these London mediums reminds me more than anything else of my old friend the distinguished Philadelphia surgeon, to whom I referred in the preceding portion of this paper. Some of the data obtained by Lodge or members of his family are marked as "non-evidential" and others as "evidential," although close scrutiny of all would without much difficulty place them in the former group. I will give but one example, although others might easily be brought forward.

Sir Oliver records that on one occasion, at a table-sitting, he asked Raymond what the boys had called him and he replied PAT, which was quite right. Sir Oliver then asked Raymond if he would like to give the name of a brother, and he replied NORMAN, which Sir Oliver thought was quite wrong. Then Raymond amended the name to NOEL, which was accepted as correct, as applying to his brother Lionel.

About two weeks later another medium, being alone, had some automatic writing in which Raymond said: "Please listen carefully now I want to speak to you about Norman. There is a special meaning to that because we always called my brother Alec Norman." Two days later Sir Oliver and Lady Lodge had another table-sitting, at which the writing medium was also present, and Sir Oliver said to Raymond: "Do you want to say something more about that name 'Norman'? You gave a message about it to Mrs. K., but I don't know whether she got it clearly." The reply spelt out was I TOLD HER THAT I CALLED LIONEL, on which Mrs. K. said she was afraid she often got names wrong and supposed she had got the name of the wrong brother.

Sir Oliver, commenting on these communications, says that it appeared "Norman" was a kind of general nickname applicable to almost any one of Raymond's brothers, especially used when they played hockey together, although Sir Oliver and Lady Lodge were not aware of the nickname at the time of the sittings which he reports. There is more about "Norman" and hockey, but the gist of the matter is that Raymond in his communications speaks of this name "Norman" as applicable to two different brothers.

Sir Oliver with great solemnity states that he could testify that he was not aware that a name like Norman was used, nor was Lady Lodge. Assuredly it is extraordinary how these communications could be swallowed whole as "evidential." During certain phases of the Great War few families in England were better known to the readers of newspapers, illustrated and otherwise, than that of Sir Oliver Lodge. The shrewd London fakirs who ran the "medium

mills" no doubt acquainted themselves with all available facts regarding the Lodge family, as many of their kind always do, and one can easily understand how they might, through conversation or otherwise, have learned of this nickname "Norman."

I well remember with regard to one of my boys how I was suddenly made acquainted with the fact that he was known to a number of his college and athletic friends by a nickname of which I had never before heard, although he had undoubtedly carried it for a year or two. If at a spiritualistic seance I had happened to get a communication from the "other side" about him under this nickname I would certainly have been for a time somewhat confused as to the identity of the individual referred to, although in my temper of mind it would have taken a good deal more than this mediumistic communication to convince me that it was evidence of spirits.

REVIEWS

A Text-book of Pathology. By William G. MacCallum, M.D., Professor of Pathology and Bacteriology, Johns Hopkins University. Second edition, thoroughly revised. Pp. 1155; 575 original illustrations. Philadelphia and London: W. B. Saunders Company.

This unique text-book of pathology has been carefully revised by the author, with the inclusion of much new matter developed by the exigencies of war, and particularly on the infectious diseases, including those caused by animal parasites, wounds, the effects of poisonous gases and the results of malnutrition. The author has summarized this new work by inserting paragraphs or by rewriting whole chapters.

The sections on shock, acid base equilibrium, hydrocephalus, immunity in tuberculosis, meningococcal infections, pneumonia after measles, influenza, cholera, leprosy, etc., have been rewritten in large part on the basis of the author's own experience. Parasitic diseases are treated in greater length because of their wider recognition and importance.

The illustrations of this valuable work are superb and a great improvement over those commonly found in text-books; in this edition several new ones have been included.

The book is now well and favorably known and constitutes a refreshing and in many respects a remarkable departure from the style of systematic text-books on pathology. It is particularly valuable for the practitioner; from the student standpoint it is lacking in certain fundamentals, which, however, may be easily supplied by lectures and works of reference. J. A. K.

Ziegler's General Pathology. Revised by Douglas Symmers, M.D., Director of Laboratories, Bellevue and Allied Hospitals of New York. From the eleventh revised German edition. Pp. 594; 604 illustrations. New York: William Wood & Co., 1921.

This standard text-book has been revised to meet primarily the needs of the medical student while preserving its usefulness as a

convenient reference for the practitioner. The revision by Dr. Symmers appears eminently satisfactory, and he has taken advantage of the opportunity of making many changes in the text and illustrations with the introduction of considerable new matter. The general arrangement of the book, which has proved so satisfactory from the standpoint of both teacher and student, has not been disturbed. There is, however, considerable room for improvement in references to literature, and the value of the book could be considerably enhanced by including a table of contents.

J. A. K.

THE AMERICAN YEAR-BOOK OF ANESTHESIA AND ANALGESIA, 1917–1918. F. H. MCMECHAN, A.M., M.D., EDITOR. Pp. 483; many illustrations. New York: Surgery Publishing Company, 1921.

THE year-book on anesthesia and analgesia for 1917–1918 presents in a volume of 483 pages a well-edited review of the papers of nearly one hundred authors on the various phases of this branch of medicine and its related problems. These papers are arranged in sections dealing with the subdivisions of anesthesia and the topics pertinent to them.

A collection of twenty papers on the methods of anesthetization used during the war, both in the battle zone and in base hospitals, furnishes a most interesting and instructive review, and describes all the worth-while advances of anesthesia and analgesia in the surgery of the war.

The many meritorious papers on the pharmacological, physiological and pathological aspects of anesthesia illustrate well the large amount of attention and investigation which this branch of medicine is receiving. As the principles elaborated in these studies are closely concerned with the clinical application of anesthetic agents they become as significant and valuable to the surgeon as to the anesthetist.

The special methods of anesthesia and analgesia are fully covered. The specialist in almost any branch of surgery will find here a recapitulation of the advances in anesthesia of definite advantage and import in his work. The section on anesthesia, both local and general, and analgesia in obstetrics is deserving of particular mention. Besides an index to the text, a very complex index of all literature on anesthesia and analgesia for the years 1917–1918 is included.

Barton likens anesthesia to "a game of skill in which chance also figures to some degree." A study of this year-book will tend to eliminate chance in favor of safety in anesthesia.

P. F. W.

DIE THERAPIE AN DEN BONNER UNIVERSITÄTSKLINIKEN. By PROF. DR. RUDOLF FINKELNBURG, in Bonn; Dritte, vermehrte, Auflage, Bonn. A. Marcus & E. Weber's Verlag.

THIS paper-bound volume is one of the many German works now rapidly coming to this country after the war. It presents the therapeutic methods used in the clinics at the University of Bonn. Every phase of medicine is covered in a brief, somewhat outlined style. The preface promises in this third edition the inclusion of methods consequent upon war experience as they have been found useful at Bonn.

A rather careful search gives one the impression that the Allied advance in therapeusis has been a much more extensive one than that of the Germans. The therapeutic sheet anchor for the German internist, as it seems to be for all European physicians, remains in the natural springs and their waters. Much is promised for the various cures. Many of the newer synthetic preparations are used and advocated in various conditions. Treatment is for the most part along conservative lines. Many of the newer proved practices in this country are not included. Perhaps they have not filtered in with those Bonn clinics.

This volume still continues to show the pre-war spirit of German medicine, a spirit that never decided anything to be worth while unless it was of Teutonic origin. American medicine when it appeared on the Allied fronts, even though it began with almost a three-year handicap, suffered nothing by way of comparison with medicine of Europe. T. G. S.

THE PRINCIPLES OF THERAPEUTICS. By OLIVER T. OSBORNE, M.A., M.D., Professor of Therapeutics, Department of Medicine, Yale University. Pp. 881. Philadelphia and London: W. B. Saunders Company, 1921.

WHEN the reviewer prepared to review this volume, he anticipated a profitable but rather uninteresting evening. To sit down and go over carefully a book on therapeutics, does not seem altogether the most agreeable method of passing one's leisure hours. To read over the action of drugs, some of which are never used and rarely heard of, and to look over pharmaceutical data, does not seem particularly interesting. But, on the contrary, only the first few pages of this book were scanned when the reviewer became intensely interested, and before he knew it the hour was late and the book had been reviewed partially in the rapidly fleeting hours. The reviewer does not know when he has studied such an interesting, well-written book.

While upon a rather trying subject the material is presented in an extremely individualistic style, which stamps the author not only as one well able to impart what he knows, but also marks him as a man of good common sense, and incidentally one very much of a philosopher.

Osborne has divided his book into fifteen parts. These fifteen parts contain not only a thorough discussion of valuable and useful drugs, vaccines and serums, practical therapeutic measures, treatment of emergencies and various other related studies, but he also has a section on practical advice to young physicians, medical ethics, and related subjects.

The reviewer has sung the praises of the book sufficiently to indicate how much he has appreciated it. A word of criticism may possibly be not amiss. In a book which is for the greater part filled with such clean, clear-cut, definite instruction and advice it does not seem rational for the author to have spent so much time and to have given so much space to the hazy endocrines, nor to have suggested quite so frequently the use of a drug, calcium, about the pharmaceutical action of which we know relatively little.

J. H. M., JR.

A PRIMER FOR DIABETIC PATIENTS. By RUSSELL M. WILDER, PH.D., M.D., MARY A. FOLEY, Dietitian, DAISY ELLITHORPE, Dietitian. Pp. 76; W. B. Saunders Company, Philadelphia and London, 1921.

THIS little book is a brief outline of the principles underlying the dietary treatment of diabetes. It emulates in spirit the somewhat larger and therefore more detailed *Diabetic Manual* of Joslin. The word "primer" is a very apt and relatively descriptive term as applied to this volume. It should be another book "to help make the home safe for the diabetic." T. G. S.

HORDER'S MEDICAL NOTES. By SIR THOMAS HORDER, M.D. (LOND.), F.R.C.P. (LOND.), Physician with Charge of Out-patients to St. Bartholomew's Hospital. London: Henry Frowde Oxford University Press: Hodder & Stoughton, 20 Warwick Square, E. C. 4.

THIS small book of one hundred and eleven pages is a very unusual little volume. It is a collection of remarks let fall by the author in the out-patient room and in the wards of old St. Bartholomew's Hospital. These remarks are for the most part brief notes; some of them trite; some of them dogmatic; yet all of them are golden and intensely stimulating. T. G. S.

THE MEDICAL CLINICS OF NORTH AMERICA. New York Number. Vol. IV. Pp. 1637; Philadelphia and London: W. B. Saunders Company, March, 1921.

THE March number of The Medical Clinics contains some very interesting case reports by prominent clinicians of New York City. In all, there are nineteen authors who have contributed to this number. The articles are well presented, and deal with conditions and diseases which are of unusual interest for the most part. The clinic of Dr. Longcope and that of Dr. Mosenthal seem particularly timely to the reviewer. Dr. Geyelin and Dr. Rosenthal also add two very valuable contributions. Dr. Draper, as always, writes very interestingly, but seems to delight in wandering off from the beaten track into the vague mazes of diseases of the endocrines.

J. H. M., JR.

HISTORY AND BIBLIOGRAPHY OF ANATOMIC ILLUSTRATIONS. By LUDWIG CHOULANT; translated and edited by MORTIMER FRANK, B.S., M.D., late attending Ophthalmologist, Michael Reese Hospital, Chicago. Pp. 435; 100 illustrations. Chicago: University of Chicago Press, 1920.

THIS is a book which everyone interested in anatomy must wish to possess. It is a fascinating study of anatomic illustration, a history of anatomy in pictures, and will be of unfailing interest. From the crude drawings of the thirteenth century to Rembrandt's well-known anatomy lesson is an instructive survey of human development and advancement. It seems hardly credible that the misshapen and grotesque efforts of the early illustrators were made by beings of the same race as the beautiful and correct drawings of da Vinci, of Jan van Calcar, the illustrator of Vesalius, and of H. V. Carter, the illustrator of Gray.

This grouping of the illustrator's art serves again to point out the great advance which was marked by the appearance of the Vesalian treatise. Short biographies being given, one may easily pass from century to century, and Dr. F. H. Garrison's note in the appendices brings us down to our own day and Professor G. A. Piersol's *Anatomy* with its excellent illustrations by the Fabers.

Since Choulant's day, the whole field of microscopic anatomy has opened, and it is strange to think that he was one of those who bitterly opposed the introduction of pathologic anatomy.

Dr. Frank's translation, so carefully edited and annotated, is a noteworthy achievement. We only regret that he did not live to enjoy the success and appreciation which his work has gained. The University of Chicago issues this edition as "The Mortimer Frank Memorial." In it a difficult and little known book has been made easily accessible.

W. H. F. A.

THE DISEASES OF THE NEWBORN. By DR. AUGUST RITTER VON REUSS, Assistant at the University Children's Clinic and Director of the Department of the Newborn at the First University Women's Clinic in Vienna. Pp. 626; 90 illustrations. New York: William Wood and Company, 1921.

DR. VON REUSS has written a book that considers separately the first period of infancy. This division into a separate specialty is a new idea for America, and is probably only carried out in the clinic of which the author is director. The period of the newborn is usually considered as terminated when the umbilical stump is sloughed. Here it is extended beyond this time, or until the initial weight loss has been recovered and the weight of the infant corresponds to the weight at birth. It is claimed that it is not until this time that the mechanism of the infant has adjusted itself to the different mode of existence. After this time begins the period of infancy. The book is well written and sensibly published in English. It should be of value to obstetricians and pediatrists, as well as to others having the care of new babies. While books on obstetrics and pediatrics usually devote some space to the consideration of this epoch of child life, space does not permit of the detail and elaboration that has been possible in this work. Medical literature has been thoroughly searched for additional information. Authorities are quoted in the text, and the references are given in the bibliography at the end of the volume. The original publication in German was in 1914. It is to be regretted that the present publishers did not have the references brought up to date and edited into the text. A. E. S.

TRANSACTIONS OF THE AMERICAN PEDIATRIC SOCIETY. Volume XXXII. Pp. 353; 23 illustrations. Edited by DR. OSCAR M. SCHLOSS, 1920.

THIS volume comprises the report of the thirty-first annual meeting of the American Pediatric Society, which was held at Highland Park, Illinois, May 31 to June 2, 1920. Sixty papers were presented before the society of which thirty-nine are published in this book. The discussion aroused is printed with each paper; many and varied phases of pediatric thought were covered by these reports, all of which represented either the results of clinical observation or laboratory investigation. Many of these article have appeared in the current medical periodicals and the others will doubtless be made available to the profession in the same manner. In addition to the report of the scientific program the minutes give the names of the members in attendance, the report of the executive session, as well as lists of officers, members, meeting places and other information of the activities of the society. A. E. S.

EDEMA AND NEPHRITIS. By MARTIN H. FISCHER, M.D., Eichberg Professor of Physiology in the University of Cincinnati. Third edition. Pp. 922; 217 illustrations. New York: John Wiley and Sons, 1921.

IN 1915 the author published in a composite second edition his 1909 Nathan Lewis Hatfield prize essay of the College of Physicians of Philadelphia, entitled "Edema, a Study of the Physiology and Pathology of Water Absorption by the Living Organism," with his 1911 Cartwright prize essay of the Association of the Alumni of the College of Physicians and Surgeons, Medical Department of Columbia University, New York, entitled, "Nephritis, an Experimental and Critical Study of its Nature, Cause and the Principles of its Relief." This second edition contained additional evidence to substantiate the author's iconoclastic theories promulgated in the original monographs and calculated to calm the storm of adverse criticism.

The present, third edition includes the original monographs unaltered together with a more detailed colloid chemical study of edema and nephritis. The author still more vehemently insists upon the lack of relationship between the so-called symptoms, signs and complications of nephritis and actual disease of the kidney and unequivocally gives infection as the cause of vascular disease and its consequences, including chronic interstitial nephritis.

Whatever view is taken of the validity of the theories presented, much information of practical value to the physiologist, pathologist and practitioner can be obtained and, on account of the logical arrangement of the text, with a minimum of effort. The author has followed his customary method of abstracting the entire volume under the caption "The Argument," so that the general principles may be gleaned in a short time. The more detailed discussion and the experimental evidence of the text and body are referred to by page number in the argument.

The appendix contains an excellent practical summarization of the knowledge concerning the relation of mouth infection to systemic disease. The book closes with a classification of the nephritides apparently as unorthodox as the author's theory of edema appeared in 1909.

That the author's polemic tone and his sarcastic contempt for his critics, so evident in the second edition, have not been softened, is shown in the preface which states, "It is an ironic fact that I can cite today as best proof for the correctness of the general notions for which I have pleaded for more than a decade the observations of the very workers who have been most violent in their criticism of what I have written. The colloid-chemical notions of water absorption by protoplasm with their many physiological and pathological corollaries, so long a jest, are now embodied by those workers in their scientific discussions as self-evident truths in which the

original sponsor needs never to be mentioned. High commissions find alkali, glucose and colloid injection mixtures the chief things of service in shock; surgeons suddenly discover that their bad operative risks are 'acidosed' and that food and alkali may save them; while those who thought the acid content of the living mass an unchangeable value are running about their wards with respiration bags and hydrogen ion determinators."

That circle of scientists known as colloid chemists, of which the author is a recognized leader, is so small that very few persons are competent to give authoritative criticisms of his theories. Though the clinician, the physiologist, the pathologist, the chemist, is not convinced of the validity of the theories, he cannot deny that Professor Fischer's work is an emulable model of logical arrangement of the data and deductions from a masterful scientific research covering a period of more than a decade. W. H. S.

THE HEALTH OF THE INDUSTRIAL WORKER. By EDGAR L. COLLIS and MAJOR GREENWOOD, containing a chapter on Reclamation of the Disabled by ARTHUR J. COLLIS, with an introduction by SIR GEORGE NEWMAN. Pp. 450. Philadelphia: P. Blakiston's Son & Co.

THIS book, although written by Englishmen, has as wide an appeal to Americans as it has for the author's own countrymen. The subjects under discussion are international in scope and the character and conditions of employment in England and America are so nearly identical that what applies to one country applies also to the other.

The section on industrial fatigue, dealing as it does with the length of working day, seems very apropos in view of the widespread discussion on this subject that is going on all over this country at the present time. The question is dealt with from a scientific rather than an economic standpoint, but an effort is made to show that in this instance science and economics go hand in hand.

The incidence of morbid states with industrial conditions is shown; a large part of the book being devoted to this purpose. The close association of unhealthy working conditions with tuberculosis, cancer, diseases of the female genitalia, and the general health of the workers is brought out in a series of chapters that go into the matter very exhaustively. Statistics are used in an effort to prove their contentions in a very extensive and intricate way, so much so at times that it seems as though one would have to be an expert statistician fully to understand them.

The questions of home diet and food at the factory; the effect of alcohol on health and efficiency; ventilation, lighting and sanitary arrangements; labor turnover; methods of maintaining and improv-

ing the health and efficiency of the individual employees; and the reclamation of disabled workers are the subject that are fully and satisfactorily covered in this work.

The bibliography is complete and conveniently placed at the end of each chapter. S. J. R.

SCURVY PAST AND PRESENT. ALFRED F. HESS, M.D., Clinical Professor of Pediatrics, University and Bellevue Hospital Medical College, New York City. Pp. 279; 25 illustrations. Philadelphia: J. B. Lippincott, 1920.

HESS has compiled an instructive and interesting volume comprising a complete review of the literature and scientific studies made on scurvy. The historic sketch is of value as showing how very recently knowledge of this disease has become generalized. One might state that a definite recognition of this disease only dates back over the last twenty to thirty years; before this time but few observers were able to differentiate this affection from the other hemorrhagic diatheses. One cannot but be impressed with the lack of recognition of the means of prevention and to even a greater degree to the lack of adaptation of proved preventive measures. Prevention has become still more complicated by that comparatively newly recognized group of food essentials, termed "vitamines." According to the author, "It has become increasingly evident that the attention of physiologists and clinicians has been focussed too sharply and too narrowly on the caloric value of foodstuffs." Study has proved that our former dependence was correct, that a small amount of orange or lemon juice is essential for the eradication or prevention of scurvy. These dietetic articles are not alone curative or preventive, but there are others almost equally effective, such as a moderate quantity of fresh cabbage, raspberries and canned tomatoes. Other foods in large quantity, such as milk and fresh uncooked meats, have definite preventive qualities.

The subject is discussed under the following headings: History of scurvy; pathogenesis and etiology; the antiscorbutic vitamine; pathology; experimental scurvy; antiscorbutic foods; symptomatology and diagnosis; prognosis; treatment; metabolism; relation of scurvy to other diseases.

The volume can be recommended to amplify a not too well known disease. F. C. K.

PROGRESS
OF
MEDICAL SCIENCE

MEDICINE

UNDER THE CHARGE OF

W. S. THAYER, M.D.,

PROFESSOR OF MEDICINE, JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND

ROGER S. MORRIS, M.D.,

FREDERICK FORCHHEIMER PROFESSOR OF MEDICINE IN THE UNIVERSITY OF CINCINNATI, CINCINNATI, OHIO,

AND

THOMAS ORDWAY, M.D.,

DEAN OF UNION UNIVERSITY (MEDICAL DEPARTMENT), ALBANY, N. Y.

Visceral Syphilis.—WILE (*Arch. Dermatol. and Syphilol.*, 1921, iii, 117 and 122). *Syphilis of the Spleen:* In the early stages of acquired syphilis splenic involvement is indicated by an acute splenomegaly, frequently symptomless, occurring coincident with the general lymphadenitis. WILE and ELLIOTT determined its presence by palpation in over 35 per cent. of their cases of early syphilis and feel that it probably represents the earliest syphilitic visceropathy. In only one case was the presenting symptom severe abdominal pain referable to the spleen. Of 36 cases 19 presented themselves with soft spleens, the remainder showing firm tumors. Usually under treatment the tumor rapidly decreases, and pain, if present, disappears. In a few cases, however, the splenomegaly persisted, the condition changing from an early syphilitic hypertrophy to a chronic interstitial splenitis. In the later stages of syphilis splenic involvement is rare and occurs as (1) chronic interstitial splenitis, (2) gummatous splenitis and (3) amyloid disease. Chronic splenitis is most frequently found associated with syphilitic disease of other viscera (liver, kidney, etc.), and except for the increase in size of the organ the condition possesses no clinical characteristics. It seems most likely to the author that syphilitic anemia, sometimes found in association with syphilitic splenomegaly, is due to bone-marrow changes rather than the splenic involvement, since the anemia also occurs in cases of syphilis without demonstrable splenic changes. Gummatous splenitis is common in congenital syphilis but exceedingly rare in the acquired disease. Two pathological types have been noted: (1) A diffusely enlarged spleen with palpable gummatous nodules, and (2) miliary gummas. The first form may be recognized clinically by palpation. Amyloid disease of the spleen can be clinically recognized

in the presence of evidences of the condition elsewhere, and a positive Wassermann reaction. However, amyloid disease due to syphilis is a pathological rather than a clinical entity. *Syphilis of the Pancreas:* While common in syphilis of the newborn, clinical syphilis of the pancreas in the acquired form is one of the rarest of syphilitic visceral manifestations. From a pathological standpoint Warthin believes that chronic interstitial pancreatitis is one of the most frequent visceral lesions found in latent syphilis. The condition may occur either as a gummatous pancreatitis or an interstitial pancreatitis or as a combination of the two. The symptoms are not pathognomonic. The author feels these points are suggestive of syphilis when the pancreas is the site of the disease: jaundice without other cause, glycosuria and pancreatic tumor without cachexia. The therapeutic test is the most efficient diagnostic aid.

Studies on Measles.—Blake and Trask (*Jour. Exp. Med.*, 1921, xxxiii, 385 and 413). Of seven monkeys receiving intratracheal injections of unfiltered nasopharyngeal washings from cases of measles in the preëruptive and early eruptive stages of the disease, five developed symptoms closely simulating those of the disease in man. Similar symptoms were induced in one monkey by inoculating the nasal and buccal mucous membranes with unfiltered washings and in two other monkeys by the intratracheal inoculation of washings which had previously been passed through Berkefeld N filters. The characteristic group of symptoms which follow the inoculations was successfully carried through six passages by intratracheal injection of saline emulsions of the skin and buccal mucous membranes of monkeys killed from two to six days after the onset of the reaction. From the fourth passage monkey the reaction was successfully induced in three monkeys by the transfusion of citrated whole blood. Blood cultures were negative. The symptoms induced were constant and definite, the only conspicuous difference between the experimental disease and human measles being the absence of respiratory symptoms in the former. Moreover, histological examination of the lesions of the skin and buccal mucosa revealed no essential differences in the two conditions. The conclusion is drawn that monkeys (*Macacus rhesus*) are susceptible to inoculation with the virus of measles.

Experimental Studies on the Nasopharyngeal Secretions of Influenza Patients.—Olitsky and Gates (*Jour. Exp. Med.*, 1921, xxxiii, pp. 125, 361 and 373). These investigators communicate, in a series of three papers, the results of their studies at the Rockefeller Institute on influenza. Their work to date may be summarized as follows: (1) An active transmissible agent present in the nasopharynx in early cases of influenza produces characteristic clinical and pathological effects in rabbits and guinea-pigs (fever, leukopenia, lung hemorrhage, edema and emphysema). This active substance disappears or diminishes in the nasopharyngeal secretions of cases of epidemic influenza early in the disease and seems to be absent in healthy persons and in other pathological conditions. (2) This agent passes through a Berkefeld filter and the filtered material produces the same effect in experimental animals as the unfiltered material. The agent withstands the action of glycerol 50 per cent. for periods up to nine months (thus resembling

the virus of poliomyelitis, smallpox, etc.). (3) Concurrent infections occurred in the experiments described and are regarded as accidental. Experiments were performed which indicated that the presence of the "influenzal agent" in the pulmonary tissue encouraged the invasion of the lung by ordinary bacteria such as the pneumococcus, streptococcus and Bacillus pfeifferi. In no instance did death occur in rabbits as the result of the uncomplicated effects of the "influenzal agent." When death occurred there was always present infection of the lungs by ordinary bacteria (pneumococcus Type IV and atypical Type II, streptococci and hemoglobinophilic bacilli, etc.).

Focal Infection and Selective Localization on Streptococci in Pyelonephritis.—Bumpos and Meisser (*Arch. Int. Med.*, 1921, xxvii, 326). In a study of six patients with pyelonephritis and dental sepsis the authors have attempted to ascertain by the intravenous injection of the Streptococcus viridans obtained from the teeth whether or not there exists a relationship between the two conditions. The technic of Rosenow was employed and 27 rabbits were injected with the primary cultures. At autopsy 24 of these had lesions in the kidneys, 8 in the bladder, 4 in the muscles, 3 in the stomach, 3 in the endocardium, 2 in the myocardium and 4 in the joints. The extra-urinary lesions were relatively slight in each instance. On subsequent animal passage of these strains this affinity for the urinary tract was shown to decrease. The conclusion is arrived at that "pyelonephritis may often be due to focal infections harboring streptococci which have a selective affinity for the urinary tract and that the colon bacillus which is commonly found and generally believed to be the cause, is of secondary importance.

The Cause of So-called Idiopathic Hydrocephalus.—Dandy (*Johns Hopkins Hosp. Bull.*, 1921, xxxii, 67). It is recalled that until recent years all cases of hydrocephalus were considered to be idiopathic. It seems certain now that one group of these cases has, as its underlying pathology, lesions occluding the ventricular system (obstructive hydrocephalus). The present communication deals with human experimental cases of so-called communicating hydrocephalus in which free communication was proved to exist between the ventricles and subarachnoid space, and an attempt is made to "correlate all the anatomical variations of communicating hydrocephalus into a single disease with a fundamentally similar pathology." Extracts from the author's summary and conclusions follow: The cerebrospinal fluid circulates in a closed vascular system. This is just as well defined as the vascular system for blood, lymph, bile or urine. In the ventricular system the fluid is produced but not absorbed; nearly all the cerebrospinal fluid is absorbed in the cerebral sulci (to which it passes from the ventricles via the cisternæ). Collateral circulation is almost precluded either in the ventricles or in the cisternæ. An obstruction in these spaces, therefore, results in hydrocephalus—if the obstruction is situated in any part of the ventricles an "obstructive" type of hydrocephalus is produced; if it is situated in the cisternæ or in the main branches of the cisternæ a "communicating" type of hydrocephalus results. That the latter type of hydrocephalus is due to obstruction in the cisternæ or their main branches is demonstrated by its experimental production in animals and by the demonstration of such an obstruction in living patients by

cerebral pneumography. Adhesions, which follow meningitis and occlude the cisternæ, cause the vast majority of cases of communicating hydrocephalus, although in two cases cited the condition seemed to depend upon a congenital failure of the cisternæ or of its branches to develop. Brain tumors may also be a cause.

Experimental Inoculation of Human Throats with Avirulent Diphtheria Bacilli.—Moss, Guthrie and Marshall (*Johns Hopkins Hosp. Bull.*, 1921, xxxii, 37). The authors summarize the results of their extensive investigations as follows: "(1) The carrier state was easily produced in human beings by inoculation of the throat with avirulent diphtheria bacilli. (2) When thus produced the carrier state lasted for a long time, two of the carriers still harboring avirulent diphtheria bacilli after fifteen months. (3) The previous administration of diphtheria antitoxin subcutaneously did not prevent the lodgment and growth of the organisms. (4) Inoculation of avirulent diphtheria bacilli into the throats of human beings did not produce: (*a*) clinical diphtheria; (*b*) any subjective symptoms; (*c*) any objective change in the appearance of the throat. (5) The results of the guinea-pig test for virulence were confirmed when thus tested with human beings. (6) No cases of clinical diphtheria developed among the associates of these artificially produced "healthy carriers" of avirulent diphtheria bacilli. (7) When isolated in pure culture after prolonged sojourn in the human throat the bacilli were not altered in morphology or in their staining or cultural characteristics. (8) The bacilli showed no tendency to become virulent as a result of this type of animal passage, either in the carriers who had received diphtheria antitoxin or in those who had not. (9) Spraying the nose with gentian violet in a strength which could be tolerated seemed to be without effect in eradicating avirulent diphtheria bacilli." The following are the conclusions of the investigators: "(1) Avirulent diphtheria bacilli retain their characteristics despite long residence in the human throat or transfer from one human being to another. (2) Avirulent diphtheria bacilli are devoid of pathogenic importance for man. (3) The carrier of avirulent diphtheria does not constitute a menace to the health of the community."

SURGERY

UNDER THE CHARGE OF

T. TURNER THOMAS, M.D.,

ASSOCIATE PROFESSOR OF APPLIED ANATOMY AND ASSOCIATE IN SURGERY IN THE UNIVERSITY OF PENNSYLVANIA; SURGEON TO THE PHILADELPHIA GENERAL AND NORTHEASTERN HOSPITALS AND ASSISTANT SURGEON TO THE UNIVERSITY HOSPITAL.

Subphrenic Abscess.—Ullman and Levy (*Surg., Gynec. and Obst.*, 1920, xxxi, 594) review the literature on this subject and report a case cured by operation. Of 890 cases collected by Piquand in 1908, 28 per cent. followed gastric and duodenal ulcers and 21 per cent.

appendicitis; 15 per cent. were associated with the liver and biliary passages; 6 per cent. with intestinal diseases; and the remaining 3 per cent. with various conditions. Of Barnard's series of 76 cases collected from the London Hospital, gastric and duodenal ulcers were responsible for one-third of the cases (34 per cent.), appendicitis for one-sixth (15 per cent.), tropical and hydatid diseases of the liver for one-sixth (17 per cent.); the remaining were distributed among rare conditions, such as cancer of the pancreas, pyosalpinx, splenic infarct, gall-stones, etc. Since 1908, appendicitis as the cause of subphrenic abscess appears to assume the principal etiological role. This view was vigorously suggested by Heffinger in 1912. Subphrenic abscesses are apparently not so common today as formerly. The improvement in diagnostic skill, and the almost universal employment of the roentgen ray for thoracic and abdominal diagnosis, together with the realization of what clinical diseases may be complicated by a subphrenic abscess, have apparently rendered this condition an uncommon occurrence today. In the present paper they reported a case of a patient who developed a subphrenic abscess while under care, showing that such a condition may occur even under hospital supervision; secondly, the case is worthy of record in view of the interesting roentgenological findings of an abscess with gas formation. Moore has pointed out that roentgenological illustrations of subphrenic abscesses containing gas are very rare.

Two Hundred and Fifty Operations on the Gall-bladder and Ducts.—McGuire (*Surg., Gynec. and Obst.*, 1920, xxxi, 617), says all gall-stones have their origin in a primary cholecystitis. Typhoid bacilli are present in only 7 to 10 per cent. of gall-stones. The mode of transmission of the primary infection is not positively determined. He is of the opinion that it is almost always carried by the blood-stream, and rarely, if ever, by direct extension. It is probably more frequently associated with a primary lesion elsewhere in the abdomen. A diseased appendix is very frequently present when stones are found in the gall-bladder. It is probably the cause of the primary cholecystitis in more instances than is commonly believed. Gall-stones are rare in young people. In less than 15 per cent. was the patient under thirty years, while over 60 per cent. occur between the ages of thirty and fifty years. Jaundice has received too much emphasis as a diagnostic symptom. Probably when the primary cholecystitis is present, a goodly proportion have a mild jaundice, but it is slight and usually forgotten. Stones in the gall-bladder or the cystic duct produce jaundice only by pressure on the common duct or by associated cholecystitis. Attacks of pain in right upper quadrant are most frequent symptoms of stones. Cholecystectomy is the operation of choice where there are stones in the gall-bladder or cystic duct. It is probably the operation of choice where stones are in the common duct, if one is positive all stones have been removed, because stones in the common duct are so often associated with an old contracted gall-bladder. The mortality from cholecystectomy is now sufficiently low so that decision for or against the operation should be judged largely by the percentage of ultimate cures. In cancer of pancreas, the mortality is so high that operative procedure is prohibitive. If operation be done, anastomosis between gall-bladder and stomach is the one of choice.

PEDIATRICS

UNDER THE CHARGE OF
THOMPSON S. WESTCOTT, M.D., AND ALVIN E. SIEGEL, M.D.,
OF PHILADELPHIA.

The Necessity of Clear Thinking in Milk Modification.—Hill (*Jour. Am. Med. Assn.*, March 5, 1921) states that there are several methods of milk modification in good use. It is not of great importance which one is used provided the physician gives enough food in total quantity and the proper combination of the individual food elements to suit the digestion of the baby he is dealing with. It is necessary that he should know approximately the amount of each food element in the mixture in order that he may vary these quantities at will, that he may be able to proceed in a rational manner and that he may be able to express clearly to others in the exact language of figures what he has done. The modification of milk is the mechanical part of infant-feeding. He thinks that the best thing for the average physician to do is to learn the whole milk method and the gravity cream and skimmed milk method. He should discard the methods of top milk dilutions. With these two methods he will have at his hand a large range of formulas, and if he desires to give more fat than can be obtained by the whole milk method he can turn to gravity cream and skimmed milk method.

Clinical Investigations of Xerophthalmia and Dystrophy in Infants.—Bloch (*Jour. Hygiene*, January, 1921) states that there are fats which are indispensable for children because they contain specific bodies essential for normal growth. If these lipoid bodies termed "fat soluble A" bodies by McCollum are absent from the food for a long time an inhibition of growth will occur and the conditions which the writer has termed Dystrophia alipogenetica will finally appear. This condition involves a great susceptibility and lowered resistance to all infections and often leads to xerosis of the conjunctivæ and cornea associated with night blindness. The xerosis has a great tendency to result in keratomalacia. In its first stage xerophthalmia resembles a slight conjunctivitis. The children develop photophobia, their eyes are red and there is a slight secretion. Xerophthalmia generally occurs in spring, the time when its growth is at its maximum. The disease is most frequent among the children of the poorest country people, and it is always due to an unsuitable artificial diet, generally the replacing of whole milk partly or completely by centrifuged milk, buttermilk or flour preparations. It may appear in children who have received whole milk and cream, but in these cases the milk and cream have been boiled for too long a time or have been subjected to other kinds of drastic treatment, which have destroyed the specific lipoid bodies. Xerophthalmia is easily cured when it is recognized in time. The best treatment is cod-liver oil, but whole milk, cream and butter and also eggs contain the necessary lipoids. It is important to remember that these foods should be only subjected to the ordinary short boiling. The disease is fairly common in Denmark and apparently more so than

in other countries. This is explained by the fact that milk and dairy products are a great part of the exports and the natives deprive themselves to furnish these products for market. Many of the cases of blindness and leukoma attributed to the eye diseases are perhaps due to xerophthalmia. This is perhaps emphasized by the fact that this blindness is increasing, whereas the incidence of gonorrheal and other forms of conjunctivitis is becoming less in Denmark.

Lactic Acid Milk.—Sherman and Lohnes (*Jour. Am. Med. Assn.*, October 2, 1920) undertook this study for the purpose of investigating the variations of this preparation of milk and to devise a means to prevent their occurrence. Lactic acid milk differs from ordinary sour or spoiled milk in that it is a sour uncontaminated sterile milk. The authors have used it for more than eight months with very good results. With their method of mixing, four of the points of advantage which are emphasized in protein milk are obtained. There is a relatively high protein, a full fat, the fine curd during digestion and the concentrated food. They believe that it is the lactic acid in the protein milk that stimulates digestion, both gastric and intestinal, and sterilizes the intestinal content. Lactic acid milk contains only 1.5 per cent. more of lactose than protein milk. Lactic acid milk contains nearly twice the amount of the soluble salts as does protein milk and less of the insoluble salts. They use two sorts of lactic acid milk, one made from skimmed milk and the other from whole milk. This makes the formulas very flexible as regards the use of fats. Their policy is to begin with the product made with skimmed milk and gradually lessen the dilution, and when undiluted lactic acid milk is reached the form made from whole milk is begun well diluted and the dilution gradually eliminated. In order to make the formula smooth barley water is used in the formulas. This is of a strength of from 0.5 to 0.75 per cent. The first method is to warm the milk, which has been boiled and then cultured, and put it away in a fireless cooker or in a nursery refrigerator. If put away in the evening at 85° F., in the morning it will be found to have undergone a proper fermentation with an acidity of from 70 to 90. To prevent further fermentation it is put on ice or preferably boiled rapidly. While being boiled it must be beaten with an egg beater. The other method is more simple. They take the milks, either skimmed or whole, and in the morning add the ferment in the proportion of 1 ounce of ferment to 31 ounces of milk. This is placed in a warm place until the next morning. The whole or skimmed lactic acid milk is then diluted with an equal part of whole or skimmed sweet milk that has been boiled, and as the acidity of the lactic acid milk will be from 170 to 190, we thus get the desired acidity of from 75 to 95. This mixture is boiled or not as desired and is placed away on the ice, where it will keep well for twenty-four hours. Modifications can be made according to the need of the case. To supply the carbohydrate needs corn syrup is used. Infants show improvement of appetite and they like the formula better and are more liable to retain it by this method. They soon lose their ashy-gray color. Their temperature becomes more stable. They are less fretful. Their sugar tolerance seems less easily broken and gas formation is less likely to occur. The loss of weight is overcome by a substantial weekly gain.

Acrodynia.—Weston (*Arch. Ped.*, September, 1920) reports 8 cases. They began with loss of appetite and listlessness. Some had infections of the upper respiratory tract and some did not. Intestinal symptoms were seen in some and not in others. All had loss of appetite, loss in weight and diminished reflexes. Knee-jerks were sometimes absent for weeks. Profuse perspiration all over the body with scratching and more or less maceration of the skin was a common feature. In every case the hands and feet became cold, bluish red and swollen and tender and painful to touch. One case had photophobia and inflamed conjunctivæ, and this patient also had a small area of necrosis about two erupting teeth. Two patients had necrosis of the gums and alveolar processes in both upper and lower jaws. One lost six and the other eight teeth. None had a temperature of more than 102°. The predominance of opinion seems to be that this condition is a food deficiency disease like pellagra. The disease is self-limited and therefore treatment should be directed toward making the patient comfortable and sustaining the strength by giving a well-balanced diet.

The Effect of Tonsillectomy on the Recurrence of Acute Rheumatic Fever and Chorea.—St. Lawrence (*Jour. Am. Med. Assn.*, October 16, 1920) studied 85 children, all of whom had presented one or several rheumatic manifestations before the tonsils were removed. The time elapsed was an average period of three and a half years. The tonsils were markedly hypertrophied in 13 per cent. of the cases, moderately so in 69 per cent. and not enlarged in 18 per cent. of the cases. They were the site of recurrent inflammation before the tonsils were removed in 73 per cent. of the cases. Sore-throat recurred after removal in 7 per cent. of these cases. At least two operations were necessary before the tonsils were completely removed in 22 per cent. of the cases. The tonsillar lymph nodes were enlarged in 100 per cent. of the cases before the operations were performed, while in 59 per cent. they were not palpable afterward. One or more attacks of acute rheumatic fever had occurred in 42 cases before the tonsils were removed. After tonsillectomy there were no recurrences in 35 cases, or 84 per cent. One or more attacks of chorea had occurred before the removal of the tonsils in 40 cases, and there were no recurrences after operation in 20 cases, or 50 per cent. Sixty-one cases showed myositis and bone or joint pains before the operation, and there were no recurrences in 47 cases, or 77 per cent. Fifty-eight cases of organic disease of the heart were present in the series. Twelve of these patients had suffered at least one attack of cardiac failure before operation. One patient suffered one attack after operation. The exercise of tolerance in the cases of cardiac disease seemed to be favorably influenced by tonsillectomy in the instances in which indication existed for the removal of the tonsils. Nutrition and general health were improved and intercurrent diseases were less common after the tonsils were removed.

Experiences with Luminal in Epilepsy.—Grinker (*Jour. Am. Med. Assn.*, August 28, 1920) has treated 100 cases of epilepsy with this drug. In this paper he enumerates a number of cases in which the drug was used. In some of his cases the patients have been free from attacks for a period of three to four years, others from one to two years,

and many more for periods of a number of months. During the war, he often used sodium luminal. The dose of this is much larger and the effects are not nearly so good. Luminal in small doses of from $1\frac{1}{2}$ to 2 grains once or twice a day was found capable of causing the arrest of the convulsions of epilepsy. Larger doses are seldom required, but may be safely given. Large doses may be given when beginning treatment, especially after withdrawing the bromide. In these cases the dose may be reduced to the average dose. No harmful effects have been observed from the long-continued use of luminal, and it does not seem to have a habit-forming tendency. The effect on the mentality of patients taking luminal has been surprising. The patients taking average doses do not manifest the mental torpor of those taking bromides.

OBSTETRICS

UNDER THE CHARGE OF

EDWARD P. DAVIS, A.M., M.D.,

PROFESSOR OF OBSTETRICS IN THE JEFFERSON MEDICAL COLLEGE, PHILADELPHIA.

Disturbance of the Circulation in Pregnancy.—HERRICK (*Med. Clin. North America*, 1920, iv, 179) describes the case of a woman admitted to the hospital while pregnant, with dilatation of the heart and insufficiency of its valves, high blood-pressure, congestion of the lungs and liver, dropsy and dyspnea. In the treatment of the case a diet was given free from salt and the quantity of fluid had been limited to 1200 c.c. each day. Digitalis was given three times daily. The diet was varied and drugs were given to stimulate the action of the kidneys. Under the influence of digitalis the pulse was kept between 60 and 80. The patient improved under this treatment and during the first month there were no attacks of dyspnea and the patient became much more comfortable. The area of cardiac dulness became less, while systolic blood-pressure was somewhat less but the diastolic pressure continued to be 100. After ten weeks of treatment the patient left the hospital in the sixth month of pregnancy and had had no material loss. There was no evidence in any way of syphilis. Since going to her home the patient has been asked to limit strictly the quantity of animal food and also of salt taken. It has been observed that where this is done the blood-pressure is not so high. Regarding prognosis, many of these cases greatly improve. There is usually, however, some essential change in the myocardium and in the small vessels and serious and permanent disease usually follows. If advice is given as to the safety of pregnancy in these cases, patients and their friends must be warned that during pregnancy the woman must be kept constantly under the care of a competent physician.

Suppression of Urine in Pregnancy and Puerperal Period.—In the *Lancet*, 1920, No. 199, p. 116, JARDINE and KENNEDY publish

details concerning 12 patients who had suppression of urine during pregnancy and the puerperal state. In 11 of these cases the report was detailed. It was possible to study the state of the kidneys in 8 and in 6 of these in the cortex there was developing a symmetrical necrosis, 3 showed signs of chronic inflammatory condition and 3 had what was termed "necrosis of the cortex" of the kidney. In the remaining 2 of the 8 cases, the woman had practically a chronic nephritis. It is obvious that the fact that the urine was not secreted might be due to some of these causes. It may, however, not be possible from the clinical study of the patient to say definitely which pathological condition is present. In 6 patients there was necrosis in other organs than the kidneys. The changes in the urinary organs seem to be due to focal necrosis and the location of these lesions was largely dependent upon the arrangement of the blood supply. Wherever there was necrosis the vessels in the adjacent tissues were thrombosed. There are well defined arteriosclerosis in three and there was evidence to indicate that some wound or bruising of bloodvessels produced the thrombi seen in these patients. Curiously enough the lesions were suggestive of those seen in the toxemia of pregnancy. As regards preventive treatment, decapsulation and drainage of the kidney do not give good results because, as a rule, operation is done after the disease has fully developed. These cases furnish another indication for preventing and remedying toxemia in pregnant women.

Pregnant Women Subjected to Vaccination Against Typhoid Infection.—Valmale–Vayssiere (*Gynec. et Obst.*, 1920, i, 217) give the result of their observations and experiments. A vaccine was prepared which was monovalent with 500,000,000 bacilli to each cubic centimeter. Injections a week apart were made into the extensor surface of the arm, doses varying from 1, 1½ to 2 c.c. When animals were studied there was a positive agglutination in the young but not to so great an extent in the others. When rabbits were injected the young die before birth or soon after, but the vaccine was given in doses very large in comparison with the size of the rabbit. During the last six weeks of pregnancy women received vaccination averaging four injections each. It could not be seen that this treatment had any bad effect on the child. The reaction in pregnant women was essentially the same as in the non-pregnant, nor was the blood altered. When the breast milk was studied up to the third injection the agglutinating power of the milk increased. If the serum of the blood and the serum of the milk were tested, the milk serum was always lower than that of the blood. This seems to depend on the action of the epithelia of the breasts. In the majority of cases the serum of the fetus had less agglutinating power than the mother's. This would indicate that in most cases the fetus was passively immunized through the mother although this is not true of all.

An Interesting Illustration of the Extension of the Sphere of Cesarean Section in Its Classical Form.—This is given in a paper by Blanko ("A Classical Cesarean Section in Pregnant Women Suffering from Bronchopneumonia," *Siglo med.*, 1920, lxvii, 204). After the sixth month of pregnancy, bronchopneumonia is very fatal for the

mother, some have a general septicemia with high fever, weakness and changes in the heart muscle. Pregnancy usually terminates prematurely with the loss of the embryo or child and treatment in the mother is usually without effect. In other patients the disease is localized and the mother's general condition is fairly good, when pregnancy is interrupted in these patients they become much worse. Among others threatening symptoms develop caused by the mechanical effect of pregnancy upon the circulation. These patients are threatened with heart failure, becoming partially asphyxiated with a rapid weak pulse. Some of these cases the writer has treated by the classical Cesarean section under spinal anesthesia, the mother making a good recovery. It is obviously necessary to use great care and judgment in selecting such cases for operation, for if section be done in unsuitable cases the result will be disastrous.

Amniotic Hernia.—FRIEND (*Surg., Gynec. and Obst.*, September, 1920) described a case of this comparatively rare condition. This is found about once in 6000 cases and goes back to the period when the embryo is forming and the umbilical cord developing. Among the different kinds of umbilical hernia, we find described congenital hernia of the cord, amniotic hernia, infantile umbilical hernia and adult umbilical hernia. The writer believes that the term "congenital hernia of the cord" is incorrect and should be supplanted by the term "amniotic hernia." The coverings of this type consist of the amnion, then a layer of Wharton's jelly, and then a thin sac continuous with the peritoneum, and usually so transparent that its contents can be seen. In size the hernia may vary, from the tiny protrusion to an almost complete evisceration. Under the title of "amniotic umbilicus" some writers describe what is practically this condition. The writer narrates and illustrates the case of a newborn child having a large ventral hernia, the size of the child's head, together with undescended testes. The hernial mass was covered with peritoneum and amnion. This seemed to be reflected on to the mass and contained a considerable amount of Wharton's jelly. Through the thin walls of these coverings, one could plainly see the stomach, liver and intestines. The child lived for two days and at autopsy the case apparently belonged to the common type of congenital abdominal hernia, in which amniotic adhesion was an important factor in causation. So far as treatment is concerned, operation immediately after birth is imperative. This must be done before the thin membrane covering the abdominal wall has a chance to become hard through drying and also before the size of the hernial protrusion has been increased by the accumulation of fluid in the stomach. Operation can be done only on those cases where the contents of the tumor can be reduced into the abdomen and the opening in the abdomen closed. If the attempt is made to resect the liver or other abdominal organ, the child usually dies. In Olshausen's method, the skin around the sac is separated, Wharton's jelly is removed and the hernia is reduced entirely, without opening the sac, followed by suture of the skin. Where the protrusion is small, operation is not desired; much can be done by keeping the parts carefully clean, using aseptic precautions and making pressure on the tumor with adhesive plaster which goes around the entire abdomen. The writer lays considerable stress

upon the fact that the term "amniotic hernia" should be substituted for "congenital umbilical hernia" which is often employed. A photograph and a roentgen-ray picture accompany the article.

The Death of Newborn Child from Broken Neck. — HERSMAN (*Surg., Gynec. and Obst.*, September , 1920) reports 8 cases of newborn children in which the child's life was lost because the axis and atlas were separated, causing death by pressure on the spinal cord. One case had been delivered by a midwife, 4 were forceps deliveries and 3 were breech presentations. In each case labor was difficult, sometimes prolonged, and considerable force was employed in extracting child. To make a diagnosis of the condition, the child's head should be allowed to drop severely forward with the chin on the chest. If the thumb of the physician is passed along the spinal column, a depression between the spinous processes of the axis and atlas large enough to admit the ball of the thumb will be found; in the normal condition no such depression exists. The writer believes that many cases formerely ascribed to apoplexy are due to such separation. Unfortunately the writer had no opportunity to hold autopsies, nor could he have the advantage of examination by the roentgen-ray.

The Influence of Cesarean Section upon the Fertility of Patients Who Have Had the Operation.—WEBER (*Inaug. Diss.*, Giessen, 1919), believes that Cesarean section has a remarkable influence upon the fertility of those patients in whom the mortality of children during normal birth becomes very high, or in whom the birth of a living child in a natural manner is impossible. Among these he would class cases of placenta previa and contracted pelvis of the third and fourth degrees. In placenta previa Cesarean section reduces the mortality of viable children to less than 10 per cent. He quotes statistics of normal mortality for Cesarean section in all classes of cases at 14 per cent. These statistics evidently do not include the results of late years in contracted pelvis. It must be remembered that most of these patients, without operation, could not produce a living child. In placenta previa many cases occur in multipara who are near the end of their child-bearing activity. In contracted pelvis of the second or other grades, the conditions are different. Many of these patients give birth to children through the pelvis. It is estimated that in these cases the highest possible maternal mortality is 5 per cent. It is true that the operation offers the possibility of sterilization. Where the operation is performed for contracted pelvis of considerable degree, it is estimated that at least 60 per cent. of these patients subsequently produce children. In the lesser grades of contracted pelvis it must be remembered that 80 per cent. give birth to living children with little or no especial difficulty in a natural way. It is only in the more pronounced grades of contracted pelvis that radical interference becomes necessary.

The Induction of Labor by Modified Champetier de Ribes Bags.—MAXWELL (*Am. Jour. Obst.*, November, 1919) observed the different opinions of obstetricians regarding the ability to measure the fetus while still in the uterus. In his series of cases there were 161 infants weighing $8\frac{1}{2}$ pounds or more; 108 of these were born at or before term

and 53 after. The average duration of labor was 12.1 hours; 15.1 hours for those over one week overdue; 19.6 for the 16 cases overdue; 10.2 for 9 cases in which pregnancy was prolonged 3 weeks over time and 12.2 hours in 8 that were a month later. Moreover, labor lasted in 15 per cent. of the cases for 16 hours or more. This was a very favorable showing compared to other statistics. In this group of cases there were only four forceps applications; 2 for transverse position of the head and 2 when the head was low down. One child was delivered by Cesarean section after pelvic indications in version were done and operative delivery was employed in $5\frac{1}{3}$ per cent. In a series of 821 cases reported by Enge in this series 8.4 per cent. of the pelves were contracted, of which 80 per cent. were flat, a very common pelvis where the size of the child is large. In this series there were 7 Cesareans, 2 symphysiotomies. There were 10 generally contracted pelves; 76 simple flat; 17 rachitic flat; 1 generally contracted flat; 2 transversely contracted and 1 oblique coxalgic patient. Furthermore, it was not found that fetal death from overretention in the uterus was of common occurrence. Sendykowski studied the literature of the subject over a period of thirty years and was able to find but 50 cases of true delayed or missed labor. In 2750 cases at the University of California Hospital bags have been employed to induce labor in 60. The average duration of these labors was twenty-three and a half hours. The shortest was four hours. The very longest 94; in 49 of 60 cases the bag was weighted sufficiently to keep up tight against the cervix. The lack of uterine irritability becomes evident when we know that 79 per cent. of these patients demanded treatment because labor had ceased or uterine contractions were very weak. The membranes were ruptured in 17 (98 per cent.) shortly after the bag was expelled. Pituitrin was given in 30.3 per cent. to stimulate contraction. On an average the bags remained within the cervix for thirteen hours, although the greater number were expelled within ten hours. Twice the bag was withdrawn because convulsions developed and twice labor failed to appear after the bag had remained in the cervix thirty hours. The average time of pains following the insertion of the bag was five hours and ten minutes. From these and other statistics it becomes evident that differences in the irritability of the uterus must be very pronounced. Castor oil and quinin have been tried, but in the majority of cases they were useless. Operative interference was necessary, although 21 per cent. of the cases were due at term in 40 per cent. or excluding breech extraction 33 per cent. It is also difficult to accurately check the mortality of the fetus in induced labor, but it is known that obstetric operations for the termination of induced labor where the fetus is premature is followed by high fetal mortality. There is no evidence that in good hands the use of bags predisposes to septic infection. In comparison with other reports of similar nature these reports show that the induction of labor at term is considerably different from the induction of premature labor. The difference lies in the varying behavior of the uterus and in the fact that the uterine muscle is ready for labor at term, but unprepared when labor is brought on promptly. The reviewer believes there are many valid objections to the use of bags in the induction of labor. It is admitted that bags frequently displace the presenting part and cause an abnormal presentation. The use of bags is, if one can believe patients, frequently very painful. Bags

do not stimulate retraction of the uterine muscle, and this is the most important because without the dilatation and retraction of the cervix the head cannot advance and labor cannot go on. It is not uncommon experience in the induction of labor with bags to find that when a bag is expelled or removed the cervix is surprisingly little opened. The fetal head cannot descend far when a bag is used as the bag occupies a great portion of the cervix. The reviewer much prefers to induce labor by the use of bougies. If these are inserted under gas anesthesia an opportunity is given to dilate the cervix considerably with the fingers, to separate the membranes from the cervix and lower segment and thus to prepare for the dilatation of the cervix and its retraction. Two bougies rarely fail to bring on labor efficiently, while in cases in which time cannot be lost the reviewer has inserted three bougies, with very good results. The bougie tends distinctly to a softening of the cervix because its presence acting as an irritant to the uterine muscle produces not only dilatation and retraction, but also stimulates the secretion of the muciferous glands in the cervix.

GYNECOLOGY

UNDER THE CHARGE OF

JOHN G. CLARK, M.D.,

PROFESSOR OF GYNECOLOGY IN THE UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA,

AND

FRANK B. BLOCK, M.D.,

INSTRUCTOR IN GYNECOLOGY, MEDICAL SCHOOL, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA.

Varicose Veins of the Female Pelvis.—Perhaps no other subject in the large field of gynecology has been treated so negligently as the one on varicose veins of the female pelvis. This subject has, however, received considerable attention at the hands of EMGE (*Surg., Gynec. and Obst.*, 1921, xxxii, 133), who states that the symptomatology centers around one point, and that is the pain complained of and which must be carefully analyzed. One usually hears that beginning with a definite time there have appeared either bilateral or unilateral, usually left-sided pains of a dull, deep, aching character felt low down in the abdomen which grow worse on long standing and are relieved quickly when the patient assumes the recumbent position. This one complaint is just as typical for women as it is for men who suffer from varicocele and to which the condition in the female has been likened. If sufficient attention is paid to this point the history becomes suggestive enough to make the examiner look for these veins. All of the other symptoms are obscure and may hold good for almost any pelvic disturbance. There is commonly a sense of heaviness in the pelvis and the patient often

suffers from constipation. As the patient is usually examined in the recumbent position her veins are well drained and, therefore, they are not palpable. One would never fail to examine a man standing up if he would complain of anything pointing to trouble anywhere around the genital organs but custom has made the recumbent examination in women a standard. If one will take the trouble to examine the patient by rectovaginal touch in the recumbent position and then have the patient drop her legs and raise her upper body, the author believes that it is often as easy to feel these veins in the female as in the male, for the veins will fill quickly and bring out the dilatation and tortuosity in the shape of an easily compressible and doughy tumor that is much less tender than either an inflamed or an ectopic tube. The tumor will disappear again when the patient resumes the recumbent position. Furthermore, the author believes that ovarian varicosities are frequently overlooked during exploratory operations for pelvic disturbances, because the habit of having the patient put into the Trendelenburg position before the incision is made is quite common, thus putting the veins in the most favorable position for good drainage. Considering the treatment of this condition, if the distention of the ovarian or uterine venous units is directly traceable to constipation, the first principle naturally must be to regulate the bowel and if visceral ptosis is present a proper abdominal support must be added. During the period of any conservative treatment it is essential that the patient keep off her feet as much as possible so that the veins of the broad ligament may be in the most favorable position for free flow and all sexual excitement should be prohibited. Hot douches should not be given as they increase congestion, but slow lukewarm douches with 2 or 3 per cent. of menthol and 5 per cent. of alum will produce a pleasant cooling effect. When the veins have distended to such a degree that one must suppose that they cannot return to normal, operative procedures must be considered. The author does not advise resection of the distended veins nor resection of cystic ovaries, as the number of symptomatic reliefs that he has obtained is sufficiently large to indicate that suspending operations, if carried out properly and in conjunction with uterosacral shortening, will give the desired result in the cure of varicose veins of the broad ligaments and of the ovarian veins in particular.

Tuberculous Salpingitis.—An analytical review of 200 cases of tuberculous salpingitis that were observed in the gynecological department of the Johns Hopkins Hospital has been presented by GREENBERG (*Bull. Johns Hopkins Hosp.*, 1921, xxxii, 52), as a result of which he has been able to draw some rather interesting and instructive deductions. It was noted that tuberculosis of the tube occurred in nearly 1 per cent. of all women admitted and was found one and one-half times as frequently among the colored women as among the whites. Out of every 13 abnormal tubes removed at operation, one was tuberculous and nearly three-fourths of the patients who had tuberculous salpingitis were between twenty and forty years of age, while 60 per cent. of the married patients were sterile. A family history of tuberculosis was reported in 22.5 per cent. while in an additional 2.5 per cent. the con-

sort had active pulmonary tuberculosis. The chief complaint of the patients was pain (74.5 per cent.), usually situated in the lower abdomen. Not much information was obtained from the menstrual history, although it was noted that 62 per cent. of the patients had dysmenorrhea and 41.5 per cent. menorrhagia. Amenorrhea occurred in only 6.5 per cent. of the patients. Nearly half of the patients had dysuria, nocturia and pollakiuria and more than half of the patients were constipated. Approximately one-fourth of the patients attributed the onset of their trouble to some uterine activity (menstruation, pregnancy, etc.). Half of the patients had lost weight during their illness but the physical examination presented no characteristic findings, except that one-fourth of the patients had pulmonary tuberculosis. Pre-operative elevation of temperature was recorded in 62.5 per cent. The blood usually showed either an absolute or a relative leukopenia and a reduced hemoglobin. The correct diagnosis before operation was made in only 13 per cent. of the cases, and in more than half of these the diagnosis was aided by the presence of ascites. In 53 per cent. of the cases it was necessary to perform a radical operation and complications during the operation occurred in 14.5 per cent. of the patients. One hundred and four cases were drained and of these 17.3 per cent. developed fecal fistulæ. In one-third of all the patients there was suppuration of the abdominal incision. In 99 per cent. of the cases both tubes were involved, in 68 per cent. the peritoneum was involved and in 3 per cent. the appendix was tuberculous. The operative mortality in this series was 7.6 per cent., but the prognosis is grave in the presence of tuberculosis elsewhere in the body, where fever exists and where the peritoneum is involved. By means of follow-up letters 90 patients were traced and of this number 78 were found to be living from two months to thirty years after the operations and nearly all of those who are alive are in good condition.

Gynecologic Significance of Appendicitis in Early Life.—It seems to be well established that the appendix may undergo considerable grades of inflammation and yet eventually be restored to a condition of approximate normality. It is entirely probable that during the inflammatory periods of a chronic appendicitis, a serous or serofibrinous exudate is produced which finds its way by gravity into the true pelvis since one often encounters such an exudate in apparently uncomplicated pelves and wonders whence it came. Therefore, GRAVES (*Arch. Surg.*, 1921, ii, 315) believes that it is quite reasonable to suppose that, although this exudate is usually absorbed by the peritoneum, under certain conditions it may be sufficient either through bacterial or chemical influence to destroy the superficial epithelium of the pelvic peritoneum and to stimulate the subserous connective tissue into the formation of organized plastic adhesions; or it may itself become organized and form the basis of adhesions. In this way may be explained theoretically the cases not infrequently encountered in which, without sign or history of gonorrhea or puerperal sepsis, adhesions are found in the posterior cul-de-sac or implicating the surfaces of the adnexa while the appendix shows only mild evidence of disease, or perhaps none at all, to gross appearance. If besides the pelvic adhesions there is added a well-defined chronic appendicitis, or the scar of an

appendix operation performed in youth, the author believes his explanation is still more plausible; certainly more so than the attempt to ascribe the condition to an entirely improbable gonorrheal infection. For this reason appendicitis in childhood or young girlhood is an affection which must be regarded not simply with reference to the diseased organ itself but to the serious harm which it may exert on the pelvic organs, if left to work out its own destiny in a state of chronic inflammation. Early operation is therefore indicated in children when there is any suspicious evidence of appendicular infection. In the acute stage the appendix should be removed immediately to forestall if possible a secondary involvement of the adnexa. If pus is present, every effort should be made to drain the pelvis, it being feasible in certain cases to drain the pouch of Douglas through the vagina. Excepting in cases of localized abscess it is advisable to make a median line incision in order that the pelvic organs may be inspected, and that any abnormalities of position or plastic adherence may be remedied by a proper surgical procedure.

HYGIENE AND PUBLIC HEALTH

UNDER THE CHARGE OF

MILTON J. ROSENAU, M.D.,

PROFESSOR OF PREVENTIVE MEDICINE AND HYGIENE, HARVARD MEDICAL SCHOOL, BOSTON, MASSACHUSETTS,

AND

GEORGE W. McCOY, M.D.,

DIRECTOR OF HYGIENIC LABORATORY, UNITED STATES PUBLIC HEALTH SERVICE, WASHINGTON, D. C.

Studies in the Treatment of Malaria.—Mayne and Moss (*Public Health Reports*, 1920, xxxv, 3082) review certain experimental observations on the use of quinin and other remedies in the treatment of malaria. The frequency of relapse under quinin is emphasized, even though large doses are given; for example, 45 grains daily for from three to eight weeks and smaller doses lead to high percentages of relapse. The maximum tolerated dose is 120 grains of quinin sulphate on each of two consecutive days. Neoarsphenamine in doses of 0.45 to 0.9 gram control the febrile paroxysms but do not cure, but this drug, in combination with quinin, is more effective in simple tertian infections than is either drug alone.

Syphilis as a Cause of Insanity.—Donaldson (*Public Health Reports*, 1921, xxxvi, 67) by means of a questionnaire, ascertained the following facts with respect to state institutions for the insane: Percentage of male inmates whose insanity is due to syphilis, 6.2. Percentage of female inmates whose insanity is due to syphilis, 2.2. Percentage of inmates (male and female) whose insanity is due to syphilis, 3.9. Percentage of male admissions whose insanity is due to syphilis,

15.5. Percentage of female admissions whose insanity is due to syphilis, 6.1. Percentage of admissions (male and females) whose insanity is due to syphilis, 10.4. The much larger figures for admissions over inmates are due to the short period of survival of cases admitted for syphilitic mental disorders.

Venereal Disease Incidence at Different Ages.—KING and SYDENSTRICKER (*Public Health Reports*, 1920, xxxv, 3091) summarize their studies as follows: (1) For the purpose of throwing some light upon the question of the age incidence of venereal infections, and in the absence of complete data for any definitely and accurately observed population group, certain tabulations were made of approximately 8400 case reports of venereal diseases among white persons in Indiana. (2) Considering these cases as fair samples of the total cases of that type which actually exist in the population under consideration, indices of venereal disease incidence according to age of onset were computed for persons of both sexes and of different marital condition by adjusting the age distribution of cases to that for the population of Indiana in 1910. (3) While the data cannot be considered conclusive, they suggest the following points: (*a*) The greatest incidence of venereal infections occurs in early adult ages, between seventeen and twenty-five. This is true of both males and females. (*b*) The incidence of venereal infections is earlier among females than males. The modal or peak age for females is nineteen years, while that for males is approximately twenty-one years. (*c*) While the data are not definite on this point, the evidence suggests that among persons married at the time of report, venereal infections were largely premarital in the case of males and postmarital in the case of females. (*d*) There is a wide divergence in the incidence curves for males who were married previous to the time of report and for males who had remained single. In the one case, infections were confined chiefly to the younger adult ages (under twenty); in the other, the incidence in the adult ages (twenty to twenty-four) was considerably higher than in the younger ages. The effect of marriage apparently was to greatly lessen the incidence of venereal infection among males. (*e*) Gonorrhea apparently occurs at slightly younger ages than syphilis or chancroid among both males and females. (4) In view of the limitations of the data with respect to the number of cases reported, the stage at which disease was reported, the possible errors in determining accurately the age at which infection occurred, and the use of the 1910 age distribution of population, these observations cannot, of course, be regarded as definitely conclusive.

Studies on the Lethal Action of Some Meningococci on Mice, with Special Reference to the Protective Properties of Antimeningococcic Serum.—NEILL and TAFT (*Hygienic Laboratory Bulletin*, November, 1920, p. 93) endeavored to determine the value of protection tests as a method of estimating the therapeutic value of antimeningococcic serum. It was found that dead meningococci were about as fatal for mice as were living ones, though large doses were required in either case. The method does not show relative value except when practically the difference is very great. The irregular results do not lend encouragement to the use of the method for practical purposes.

Report on Investigation of Typhoid Fever Epidemic at Greenville, Tenn.—HARRUB (*Public Health Reports*, 1921, xxxvi, 72), a Sanitary Engineer, reports an outbreak of 61 cases with seven deaths due to contaminated spring water used as a municipal supply. The supply was treated with hypochlorite but the disinfectant was not properly employed, and analysis of the water showed it to be of a poor sanitary quality.

The Tropin Reactions of Antimeningococcus Serum.—EVANS, (*Hygienic Laboratory Bulletin*, November, 1920, p. 43) gives the following summary of the work reported: The phagocytic test for bacteriotropins is a workable test which distinguishes clearly between a normal serum and a serum containing the specific antibodies. The important phagocytic antibodies in meningococcus serum are bacteriotropins. That is, they are not dependent upon complement for their activity. A high concentration of tropins does not inhibit phagocytic action, but there is in serum a poisonous substance active against leukocytes of a foreign species, which suppresses phagocytic activity in low dilutions of the serum. No stains of meningococci were found which resisted phagocytosis after treatment with serum containing the specific tropins. All strains of meningococci tested produced tropins in inoculated rabbits. But not every inoculated rabbit produced tropins, presumably because of individual differences in the animals. Some strains regularly produced tropins in higher titer than other strains. After long artificial cultivation meningococci may lose their tropinogenic power, and their power to respond to active tropins. The tropin reactions of meningococci are specific, dividing them into well-defined groups, with no cross-reaction between the typical strains of the main groups. Sixty-three strains of meningococci were available for classification according to their tropin reactions. They were divided into four distinct groups, designated R, S, T, and U. Group R included 61.9 per cent. of the strains; group S included 25.4 per cent. of the strains; group T included 4.7 per cent. of the strains and group U included 1.6 per cent. of the strains. Groups R, S, T, and U are distinct groups. Every strain belonging to those groups was equal to every other strain of the homologous group in its power of absorbing tropins from serums of the homologous group. The typical strains of groups R, S, T, and U did not absorb tropins specific to a heterologous group. But 4 atypical strains were found which did, in a slight degree, absorb tropins of another group. A fifth group (Z) included 6.4 per cent. of the total number of strains of meningococci. Unlike the other four groups, group Z is not distinct but is related to the others. This relationship is shown by a partial absorption of tropins specific for those groups. Moreover, the strains of group Z differ in their relationship to one another, and they differ in their relationship to the four main groups The strains of group Z are further distinguished by a tendency to spontaneous phagocytosis. In the majority of immune serums a good tropin content is accompanied by a good agglutinin content. But agglutinins may be produced without tropins, and tropins may be produced without agglutinins. Under unfavorable conditions the deterioration of agglutinins and tropins did not follow a parallel course. Certain conditions destroyed the action of the agglutinins without injuring the tropins,

and other conditions destroyed the action of the tropins without injuring the agglutinins. One hundred and twenty-eight commercial serums were tested for their content in tropins. The tropin content was compared with the agglutinin content as determined in the official test. The results of the two tests agreed for 71.8 per cent. of the serums. For the remaining 28.2 per cent. the results were discordant.

Differentiation between Various Strains of Meningococci by Means of the Agglutination and the Absorption of Agglutinins Test.—Butterfield and Neill (*Hygienic Laboratory Bulletin*, November, 1920, p. 9) present their Summary and Conclusions as follows: (1) Classification of strains according to their geographic distribution is not possible. (2) When the agglutination test with type serums prepared from Gordon's types was applied to the Hygienic Laboratory strains, 90 per cent. of them were classified without further work. (3) If the meningococcus suspension agglutinates in a titer of 1 to 100 or higher, with only one of the type serums, provided the homologous coccus agglutinates in over 1 to 400, it may , in 100 per cent. of the cases, be classified at once without resorting to the absorption test. (4) If a meningococcus suspension agglutinates with two or more type serums in equal titer, it may in 100 per cent, of the cases be classified by the absorption test. (5) If a suspension agglutinates with two or more type serums in unequal titer the highest titer probably indicates the type. This was true in 77 per cent. of the cases tried. (6) In the monovalent serums tried the complement-fixation bodies have the same specificity as the agglutinins, the complement-fixation titer being, as a rule, somewhat higher than the agglutination titer. (7) During the course of a year's time the apparent changing of certain strains of meningococci from one type to another has been observed.

The Fate of the First Molar.—Butler (*U. S. Public Health Reports*, 1921, xxxvi, 434) states that it is a generally conceded fact that the human tooth is undergoing a process of involution due to lack of hard usage. Recent investigations by the U. S. Public Health Service not only bear out the above statement but furnish also much food for serious thought. The first molar, the first permanent tooth to make its appearance in normal dentition, is easily the most important tooth in the mouth. Not only does it present the largest masticating surface but it also largely determines the position of the other permanent teeth to follow it in eruption. In the examination of 6388 children the age varied from six years, or the year of the appearance of the first molar, to seventeen, or ten years after the eruption of this tooth. The first molar was found to be the most neglected of all the permanent teeth and the one most frequently lost. One reason ascribed to these facts is given as a failure on the part of parents to recognize this tooth as other than one of the deciduous set. Among the children of six years, the year of the eruption of this tooth, 4.8 per cent. of all these molars was found to be undergoing carious processes. This means 14.3 per cent. of all the six-year-old children were found to have one or more of these molars defective. Five years later 9 per cent. of all six-year molars were found to have been extracted or to be appearing as necrosed roots; 54.5 per cent. of all

children of this age examined were found to have one or more defective or missing first molars, regardless of such as had received professional attention. In order to determine the possibilities of successful prophylactic measures 1000 carious areas in first molars were plotted as to the location in which they occurred. For this purpose only the mouths of children of from nine to twelve years were considered, this for the reason that during this period the tooth would have been in position from three to five years, during which period no tooth would be contiguous to it upon the distal surface but upon the mesial there would have been a deciduous tooth. Thus the distal surface would have had the advantage of being polished in mastication, an advantage which could not be enjoyed by the mesial surface because of the presence of the deciduous tooth. The following findings were thus obtained: Occlusal cavities, 877; mesial cavities, 110; distal cavities, 8; buccal cavities, 3; lingual cavities, 2; total, 1000. It would appear that the difference between 110 and 8 would indicate the advantage of the distal surface over the mesial as a result, the abrasion of this surface by mastication, but as seen, the preponderance of cavities occurs upon the masticating surface, in the fissures or sulci. To faulty development is ascribed the large proportion of occlusal cavities. This seems to be of three types: (1) an arrest in the deposit of enamel at this point; (2) a lack of calcification in the enamel and (3) a failure of union when the enamel rods approximate each other in a more or less horizontal position. The writer urges a specialization in care of children's teeth and a systematic encouragement of early visits to the dentist, pointing out that only by early detection and most careful operative procedures may this important tooth be preserved for the necessary years of usefulness.

Epidemic Encephalitis (Encephalitis Lethargica, Nona). — SMITH (*U. S. Public Health Reports*, 1921, xxxvi, 207) made an investigation of epidemic encephalitis which he summarizes as follows: (1) Clinically the disease presents a series of symptoms which are found in no other affection. (2) The lack of positive epidemiological data renders the determination of the length of an incubation period impossible. (3) The clinical course of the disease may be divided into three stages: A prodromal period with fatigue, lethargy, headache, giddiness, and disturbances of vision; the stage of acute manifestations, with vomiting, fever, paralysis of certain cranial nerves, changes in tendon reflexes, alterations in speech, marked general weakness, and, in the majority of cases, coma of varying intensity; and the period of convalescence, which varies. In some cases recovery is complete within ten days or two weeks after the subsidence of the acute symptoms. In other cases, however, convalescence is prolonged and is accompanied by changes in the mental state, definite loss of function of certain muscles, and obstinate palsies of the cranial nerves. (4) There was a distinct outbreak of the disease in the United States during the latter part of 1918 and the early part of 1919. Beginning with the first case in the city of New York in September, 1918, there was a gradual increase in the monthly incidence up to and including March, 1919, during which month 61 cases occurred. This was followed by a sharp break with only 12 cases in April and 5 in May. (5) The age distribution of the cases

in epidemic encephalitis is entirely different from that in poliomyelitis, and is, it is believed, in itself alone to be sufficient grounds for the belief that the two diseases are separate and distinct affections. (6) The appearance of encephalitis in epidemic form has, with the exception of the cases reported by v. Economo, apparently always been preceded by an epidemic outbreak of influenza. This apparent relation between the two diseases remains as yet unsolved, and consequently, therefore, leaves a field for considerable discussion. Of the 122 cases of epidemic encephalitis on which definite data were obtainable, only 56 cases, or 46 per cent., gave a history of having had a preceding attack of influenza; whereas in 66 cases, or 54 per cent., the history of a recognized attack of influenza was negative. As shown in a previous section of these studies, this influenza attack rate is higher in the group of persons having had epidemic encephalitis than in the general population. The question naturally arises, "Why?" In seeking a solution to this problem two lines of thought present themselves: (*a*) Believing that epidemic encephalitis is a disease unto itself, may not this difference be due to the fact that those persons who have had influenza suffer a certain lowering of vitality, immunity, or resistance, which would render them more susceptible to the invasion of the causative agent of epidemic encephalitis when exposed to such a factor? If this be so it would account for the difference in the attack rate above mentioned. (*b*) If, however, the belief that epidemic encephalitis is a distinct disease is erroneous, may it not be possible that those cases classified as having had a previous attack of influenza are really recurrent invasions of the same person with the causative agent of influenza, whatever this agent may be, the second invasion involving or invading the central nervous system? An invasion of the central nervous system direct as a primary attack by this same agent, if such a thing be possible, would account for those cases which give no history of a previous attack of influenza. In the absence of definite positive laboratory findings in connection with the etiology of epidemic encephalitis, this thought is merely offered as a possibility. (7) Sex distribution shows 60 per cent. of the cases males and 40 per cent. females; whereas in influenza the attack rate for males and females is about equal. In the cases of epidemic encephalitis without a previous attack of influenza, the ratio of males to females is 1 to 1. In those cases having had a previous attack of influenza, however, the ratio of males to females is 2.5 to 1. (8) Onset was gradual in 71 per cent. of cases and sudden in 29 per cent. The case fatality rate, however, was 60 per cent. in the cases with sudden onset and 22 per cent. in the cases where the onset was gradual. (9) Lumbar puncture and subsequent examination of the spinal fluid, while revealing very little of a positive nature, should be done in all cases where it is possible, as it is by this means that other conditions which might be confused with epidemic encephalitis may be eliminated to almost a certainty. (10) Blood examinations reveal very little data which may be used for diagnostic purposes. (11) As for communicability, approximately 900 persons were exposed in the immediate families of the cases reported in the United States, and among this number no secondary case occurred so far as reports and inquiries show. (12) The case fatality rate was 29 per cent. (13) The results of animal inoculation with brain material from two fatal cases in connection

with these studies were negative. The fact must be borne in mind, however, that the brain material used had been retained in 50 per cent. sterile glycerine for a period of six months prior to the inoculation.

The Incidence of Tuberculosis Among Polishers and Grinders in an Axe Factory.—DRURY (*U. S. Public Health Reports*, 1921, xxxvi, 159) made a study of tuberculosis in a Connecticut industrial community covering a period of twenty years, with the following results: In the group of "polishers and grinders" the maximum number of deaths occur at the age of forty-five years instead of at twenty-five years, as among other mill workers. The dust produced in "wet grinding" is held responsible as the chief cause of the excessive mortality. Death-rate from pulmonary tuberculosis per 1000 population: Polishers and grinders from 1900 to 1919, 19.0; others in mill from 1900 to 1919, 1.6; entire mill population from 1900 to 1919, 6.5; general population of town A from 1900 to 1919, 1.5; general population of town B from 1900 to 1919, 2.4; general population of town C from 1900 to 1919, 2.1; general population, mill district as a whole, from 1900 to 1919, 2.0; general population, town of H from 1900 to 1919, 1.1; general population, state of Connecticut, from 1900 to 1919, 1.5; male population, state of Connecticut, from 1900 to 1919, 1.7.

Four Years of Framingham Demonstration.—ARMSTRONG (*Am. Rev. Tuberc.*, 1921, iv, 908) states that tuberculosis as a cause of illness in Framingham is apparently being brought under control. This is particularly true as reflected in the decreasing number of advanced cases. As to mortality the tuberculosis death-rate per 100,000 corrected for certification was 121.5. For the entire demonstration period thus far, with similar corrections, including the rate for 1920, the figure is 84.2 per hundred thousand—a reduction of about one-third. For 1920 the rate was 64.5 per hundred thousand—a reduction of about one-half under the predemonstration rate after four years of intensive work. This rate would mean that the same measures if successfully applied to 100,000 people, with 100 deaths a year at the start, would save fifty lives a year. For the United States as a whole this would mean the saving of 75,000 lives annually. In Framingham at the beginning of the demonstration the community was spending approximately 40 cents per capita per year on all kinds of health work. The community is now spending about $2 per capita per year from public and private funds combined. In a city of 100,000 people this would mean an annual health expenditure of about $200,000.

A Statistical Study of Recent Experience with Measles and Whooping-cough in Massachusetts.—HENRY (*Am. Jour. Public Health*, 1921, xi, 302) states that approximately 33 per cent. of the whooping-cough and 18 per cent. of the measles in Massachusetts are in children under three years. For a period of years (1913 to 1918) 90 per cent. of the deaths from whooping-cough and 79½ per cent. of those from measles have been under three years old. The apparent fatality rates for the group under three in 1918 were 23½ per cent. for whooping-cough and 8 per cent. for measles. For each thousand reported cases of measles in 1918 in Massachusetts there were 18 deaths,

and 14 of these were under three. In the same year each thousand cases of whooping-cough represented 92 deaths, and 77 of these were under three. Even though there has been on an average four or five times as much measles the whooping-cough fatality leads for the six years (1913 to 1918) with 2065 deaths compared with 1908 for measles. This is a total of 3973 deaths from the two diseases and 3378 were under three. Measles is more prevalent but less fatal; whooping-cough less prevalent but more fatal. In the end they cause almost equal numbers of deaths and should cause us equal concern. Measuring our success by a reduction in deaths from these diseases it is at once apparent that our results depend very largely on how successfully we prevent measles and whooping-cough in children under three, among whom about 85 per cent. of the deaths occur (90 per cent. whooping-cough; 79½ per cent. measles). Propaganda and methods of control should be more specifically directed at the age group under three. It cannot be emphasized too strongly that in these dangerous years, when so many children die of measles and whooping-cough or their complications, the most careful medical attention and nursing are needed to prevent dangerous complications.

The Destructive Effect of Oxidation on Antiscorbutic Vitamine.—Hess (*Proc. Soc. for Exp. Biology and Medicine*, 1921, xviii, 143) states that the antiscorbutic vitamine was destroyed when 4 c.c. of a normal solution of hydrogen peroxide were added to a liter of raw milk, which was then placed in the incubator over night. Bacteria did not develop in the incubator under these conditions. When 80 c.c. per capita of this milk was fed to guinea-pigs in addition to oats they all developed scurvy in about three to four weeks, a result similar to feeding experiments with milk which had been autoclaved for one hour at 120° C. The addition of orange-juice to the dietary served either to protect or to cure animals on this dietary. Orange-juice subjected to oxygen for a short period was likewise found to have lost some of its potency. It was previously found that milk or tomato-juice which had been shaken had lost some of this vitamine. Probably this deleterious action is partly due to the effect of oxidation. The harmful effect of "aging" may also be interpreted in this way. As foodstuffs undergo oxidative processes frequently in the course of various manipulations no doubt this factor plays an important role. This action probably explains the differences in the antiscorbutic potency of foodstuffs which have been treated in apparently similar ways, for example, of milk which has been heated in open pans or in hermetically sealed bottles.

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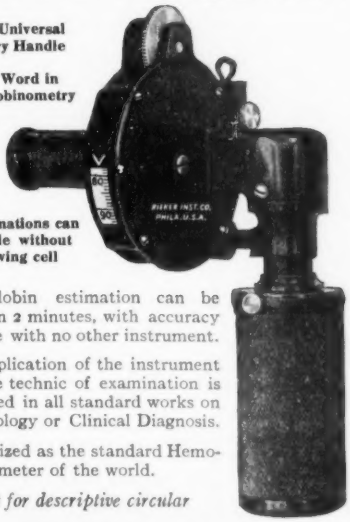

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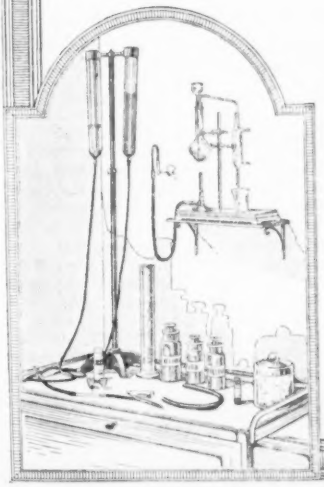

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